April 15 Cents

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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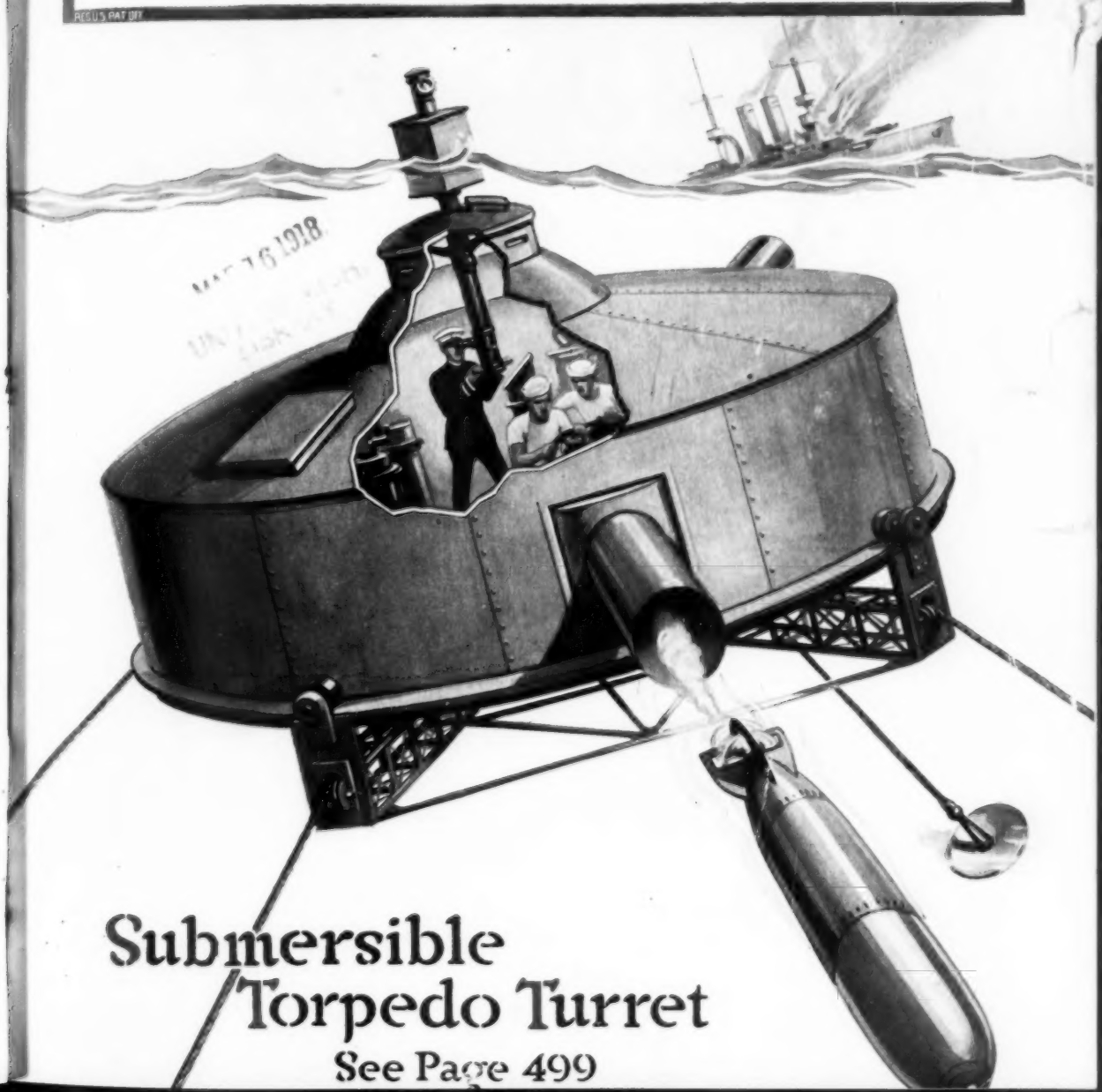

MAR 16 1918

Submersible Torpedo Turret

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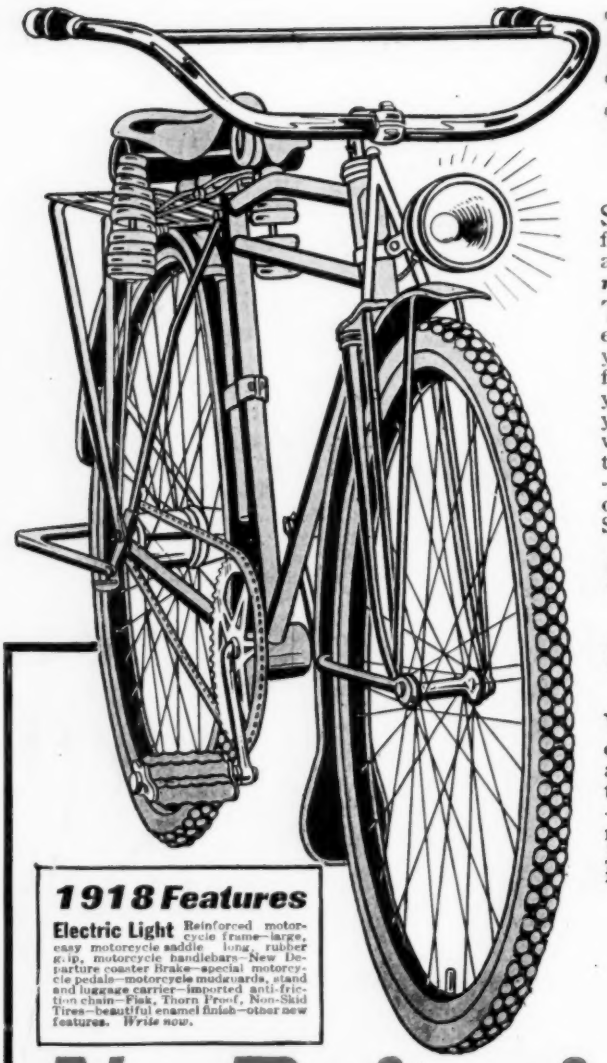

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Popular Mechanics Magazine

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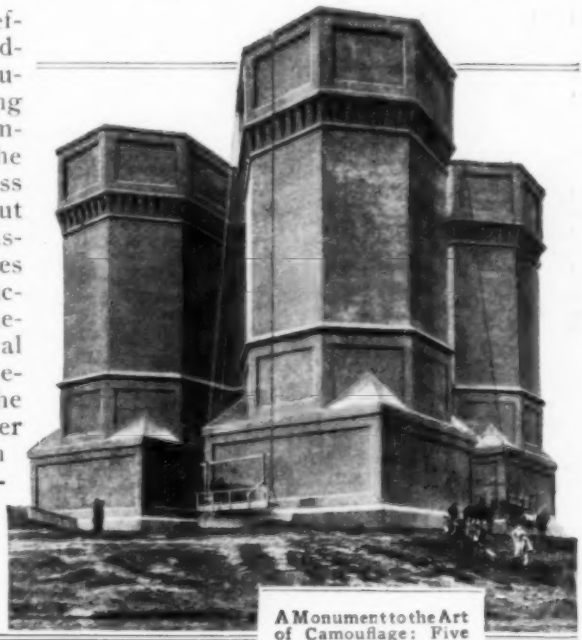
WRITTEN SO YOU CAN UNDERSTAND IT

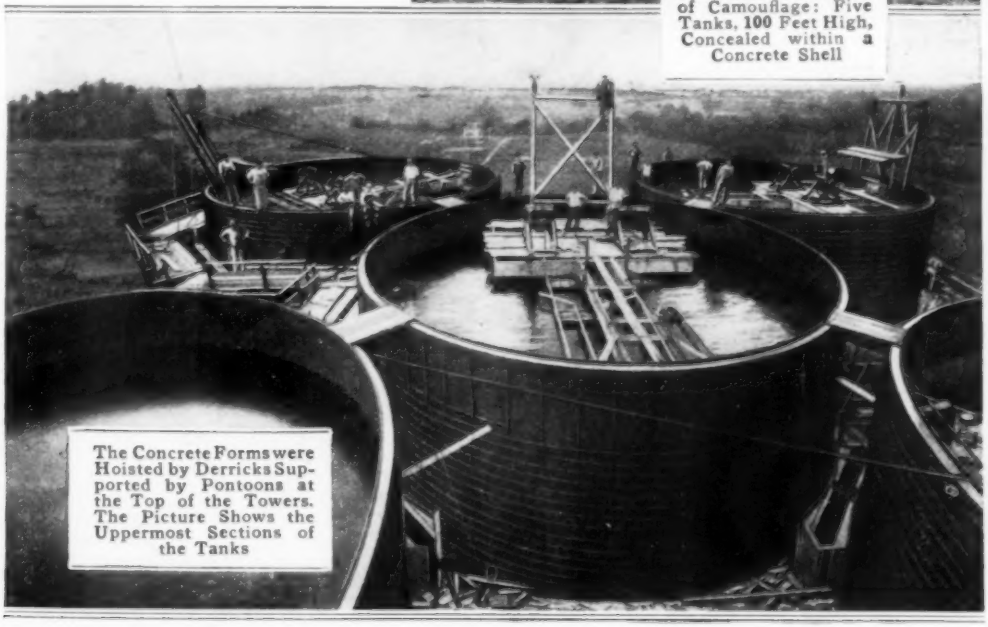
Vol. 29 APRIL, 1918 No. 4

"Old Castle" Hides Group of Standpipes

CONCRETE has been used effectively to cover the nakedness of five large steel tanks situated on an elevation in an outlying part of Cincinnati. The work demonstrates in a striking manner the ease with which unattractiveness can often be camouflaged without prohibitive cost. By simply incasing the group of gaunt standpipes in a concrete shell, a single structure, that from a distance has somewhat the appearance of a medieval castle, has been established. Before the concrete was poured, the tanks, which are 40 ft. in diameter and 100 ft. high, were filled with water. This was done to simulate actual service conditions so as to insure that the concrete veneer would not later crack by expansion of the tanks.



A Monument to the Art of Camouflage: Five Tanks, 100 Feet High, Concealed within a Concrete Shell



The Concrete Forms were Hoisted by Derricks Supported by Pontoons at the Top of the Towers. The Picture Shows the Uppermost Sections of the Tanks

DETROIT'S ICE FOUNTAIN REACHES RECORD HEIGHT

Each winter a fountain of ice lends attraction to Washington Boulevard,

Adding a Six-Foot Pipe Extension to the Ice Fountain Which, When Photographed, Was 60 Feet in Height

in Detroit. Toward the end of the past season, the crystal structure was of greater height and magnificence than at any previous time in the last quarter of a century. Prolonged cold weather and the efforts of park attachés produced an ice stalagmite of unusual proportions.

WOMEN LEARNING TO KNIT TWO SOCKS AT ONCE

The art of knitting two socks at once —one inside the other—has recently been introduced into this country from Europe and is exciting much interest among Red Cross workers. Two, instead of one, balls of yarn are required, but the regular number of needles is used, stitches being taken with each thread alternately. The outer sock is made wrong side out, while the inner one is knit in the regular way. Expert knitters differ as to whether this method is as fast as the old way, but it is agreed that it requires very close attention if mistakes are to be avoided.

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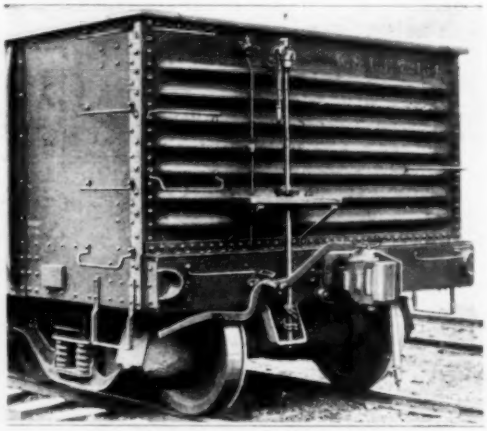
Two Socks being Knitted at Once: The Outer One is Knit Wrong Side Out, and the Inner One Right Side Out

CORRUGATED-STEEL ENDS FOR GONDOLA CARS

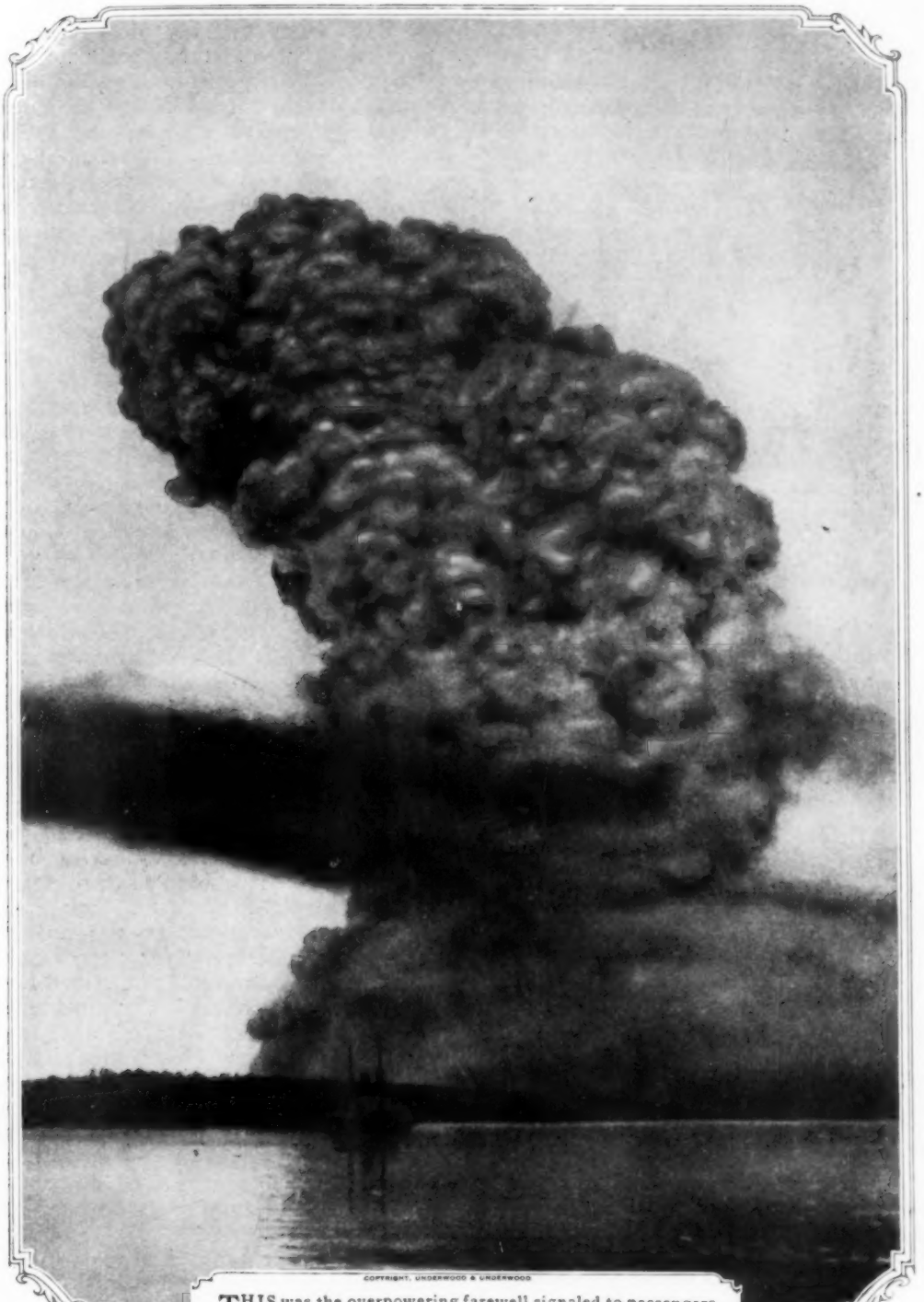
Box-car ends of corrugated steel having proven practical, the idea has been applied to gondola cars and cars having drop ends. It is claimed that flanges around the edges of these steel ends, together with the corrugations, make them 12 times as strong as the flat plates from which they are fashioned. Their ability to resist the end-



Car with Drop End of Corrugated Steel: The End is Let Down When the Load Extends from One Car to the Next

wise thrusts of shifting loads and the twisting due to unevenness in the track materially lessens the cost of keeping the cars in repair. The drop ends are hinged at their lower edges and are laid flat on the car floor when the load consists of long girders, or the like, extending from one car to the next.

HALIFAX'S GREAT BLACK CLOUD OF DISASTER



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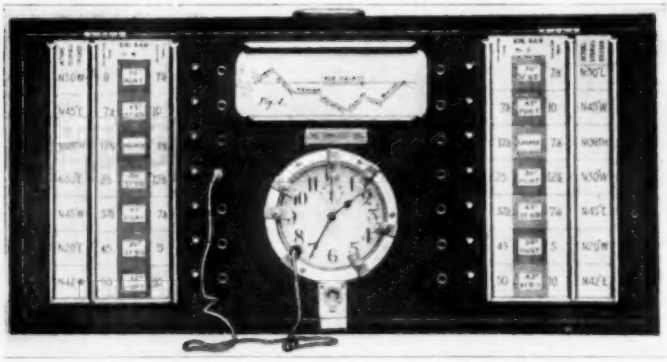
THIS was the overpowering farewell signaled to passengers of an outgoing steamer that cleared Halifax shortly before the explosion that laid the city in ruins. The vessel was 13 miles from port when the column of smoke blackened the horizon in a few brief seconds.

ZIGZAGGING TO DODGE U-BOATS MADE EASY

One objection to continued zigzagging as a means of avoiding submarines has been that it is very apt to confuse the skipper as to his true position. To overcome this serious difficulty a signal board has been invented. In its center is a clock, while at either end are a vertical row of colored bulbs and a chart divided into sections, in each of which one leg of the predetermined course is tabulated, together with the number of minutes it will occupy. Attached to the rim of the clock dial are several movable contact sockets. At the beginning of the hour the first of these is connected by a flexible cord with a socket adjacent to the bulb marking the first leg of the route. When the minute hand reaches the first socket on the dial a circuit is completed, causing the first bulb to glow. At the same time the sounding of a gong notifies the navigating officer that he should change his course as the chart indicates and move the cord to the next pair of sockets. At the close of each time period the process is repeated. Each hour's course may be made the same or different, as desired.



Zigzag-Course Signal Board: The Tables at Either Side Show the Direction and Duration of Each Leg of an Hour's Travel. The Cord is Moved with Each Change of Direction

MOVIE CAMERA'S MAGAZINE HOLDS 800 FEET OF FILM

Double film capacity is one of the unusual features of a movie camera that has been elaborately equipped to meet the varied needs of a professional moving-picture photographer. The special magazine holds 800 ft. of negative and is used for outdoor work, such as news and travel pictures require. It makes it unnecessary for the camera man to carry extra reels and reload frequently, and is particularly valuable as protection against lack of adequate footage when something unexpected happens. Other equipment with which the instrument is provided consists of 32, 50, and 75-mm. lenses and finders, a 6½-in. lens for telephoto purposes, sun shields for all lenses, a 170° shutter, a round-closing diaphragm, a square vignetting shutter, a rising and falling curtain shutter, and a studio tripod with automatic release for quick panoramic and up and down tilting motions. With its special accessories, the camera represents a $1,500 investment.

With Its Double-Capacity Magazine and Other Special Equipment, This Moving-Picture Camera Represents a $1,500 Investment

WAR FEATS OF AN ALPINO STRONG MAN

By LEWIS R. FREEMAN

Lewis R. Freeman in the uniform of a British Naval Lieutenant. Because of his brilliant articles on the war and its phases, Mr. Freeman has been appointed resident writer with the Grand Fleet.

PERHAPS the most spectacular kinema film ever produced was that one in which the incomparable Italian artist, Maciste, fights—more or less single-handed—a battalion or two of Austrian *Kaiser Jaeger* among the eternal snows of the high Alps. And perhaps the one most spectacular scene of this whole great film is that in which the hero, in order to bring about the discomfiture of his enemies, carries up a slippery mountain path on his shoulder a gun which—if it had been the real thing—would have weighed two or three hundred pounds. As the cannon (as Maciste himself told me a few weeks ago when I saw him at work in Turin) was a "property" affair of wood and tin, that redoubtable athlete was by no means so hard put to maintain his precarious toe holds in the ice as might have appeared from the film. The great Maciste, splendid soldier though he would have made, has been denied the honor of fighting for his country as a consequence of the fact that he has long been a victim of insomnia; but there is at present wearing the eagle feather of the matchless Alpini a man of scarcely less physical strength than the doughty hero of "Cabiria," who has, moreover, performed feats of strength and prowess in actual warfare quite equal to those enacted by his famous kinema prototype for the camera. I heard of him first last winter, when Col. "Peppino" Garibaldi, grandson and worthy suc-

The Alpino Strong Man Lifting Five of His Comrades: This Man Performed in the United States, and Formerly Was a Miner in the West

We are Not Permitted to Give His Name, but Some of Our Readers may Recognize Him from the Photograph

cessor of the "Liberator," told me how a man of tremendous physical strength serving in one of his Alpini battalions had made it possible—after a score of tentative plans had been rejected as hopeless—to transport to a certain isolated and commanding pinnacle a heavy mountain gun which was imperatively needed there to silence some still heavier Austrian guns which were playing havoc with the Italian positions from a lofty emplacement in the crevasse of a glacier, and where it was safe from any fire that could be directed to it from any point in Italian possession save only the one sheer pinnacle referred to. I will set down this incident in Colonel Garibaldi's own words.

"We were constantly confronted with new and perplexing problems," he said, "things which no one was ever called upon to solve before, and most of them were in connection with transportation. How we contrived to surmount one of these I shall never forget. The Austrians had performed a brave and audacious feat in emplacing one of their batteries at a certain point, the fire from which threatened to make our position absolutely untenable. The location of this battery—in the crevasse of a small glacier—was so cunningly chosen that not a single one of our guns could hope to reach it, and yet we *had* to silence it—and for good—if we were going to go on with our work. The only point from which we could fire upon these destructive guns was so exposed that any artillery we might be able to mount there could count only on the shortest shrift under the fire of the hundred or more 'heavies' that the Austrians would be able to concentrate upon it. And yet—I figured—well employed, those few minutes might prove enough to do the work in. As there was no alternative, I decided to chance it.

"And then there arose another difficulty. The smallest gun which would stand a chance of doing the work cut out for it weighed 120 kilograms—about 265 pounds; this just for the gun alone, with all the detachable parts removed. But the peak where the gun was to be mounted was so exposed that there was no chance of rigging up a cableway, while the incline was so steep and rough that it was equally out of the question trying to drag it up with ropes. Just as we were on the verge of giving up in despair, one of the Alpini—a man of Herculean frame who had made his living in peace time by breaking chains on his chest and performing other feats of strength—came and suggested that he be allowed to try to carry the gun up on his shoulder. Grasping at a straw, I let him indulge in a few 'practice maneuvers,' but these only showed that while the young Samson could shoulder and trot off with the gun without great effort, the task of lifting himself and his burden from foothold to foothold in the crumbling rock of the 70° slope was too much for him.

"But of this failure came a new idea. Why not let my strong man simply support the weight of the gun on his shoulder—acting as a sort of ambulant gun carriage, so to speak—while a line of men pulled him along with a rope? We rigged up a harness to equalize the pull on the broad back, and, with the aid of 16 ordinary men, the feat was accomplished without a hitch. I am sorry to say, however, that poor Samson was laid up for a spell in the hospital with racked muscles.

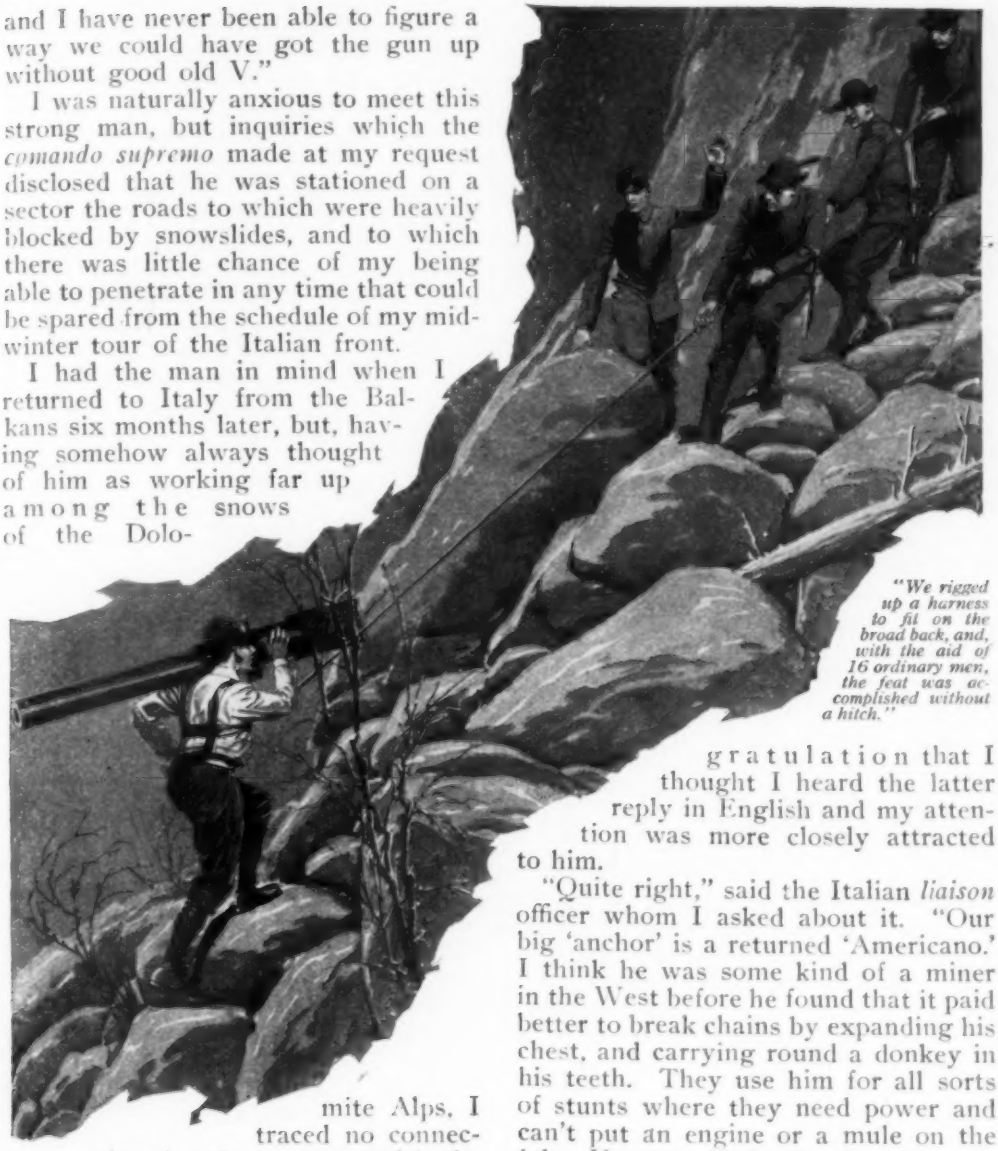
"The gun—with the necessary parts and munition—was taken up in the night, and by daybreak it was set up and ready for action. It fired just 40 shots before the Austrian 'heavies' blew it—and all but one or two of its brave crew—to pieces with a rain of high explosive. But it had done its work, and done it well. The troublesome Austrian battery was put so completely out of action that the enemy never thought that it was worth while to try to reëmplace it."

Colonel Garibaldi was quite frank in saying that his Alpini "strong man" probably saved the Col di Lano operation from failure. "Unless we got the gun up and put the Austrian battery out of action," he said, "we could never have held on to go on with our tunnel;

and I have never been able to figure a way we could have got the gun up without good old V."

I was naturally anxious to meet this strong man, but inquiries which the *comando supremo* made at my request disclosed that he was stationed on a sector the roads to which were heavily blocked by snowslides, and to which there was little chance of my being able to penetrate in any time that could be spared from the schedule of my mid-winter tour of the Italian front.

I had the man in mind when I returned to Italy from the Balkans six months later, but, having somehow always thought of him as working far up among the snows of the Dolomite Alps, I traced no connection for the moment with the Alpino who had carried the gun up the cliff of the Col di Lano and the solidly built, but by no means gigantic, captain of an Italian mountain battery tug-of-war team which, in a sun-baked little gulch of the desert Carso, I had just seen pull a team from the recently arrived British batteries over the line.



"We rigged up a harness to fit on the broad back, and, with the aid of 16 ordinary men, the feat was accomplished without a hitch."

The Tommies took their defeat like the good sports they were, and it was as one of them was slapping the Italian captain on the back by way of congratulation that I thought I heard the latter reply in English and my attention was more closely attracted to him.

"Quite right," said the Italian *liaison* officer whom I asked about it. "Our big 'anchor' is a returned 'Americano.' I think he was some kind of a miner in the West before he found that it paid better to break chains by expanding his chest, and carrying round a donkey in his teeth. They use him for all sorts of stunts where they need power and can't put an engine or a mule on the job. He must be by far the strongest man in the Italian army."

"Surely not *the* strongest," I cut in incredulously. "How about the man who carried the mountain gun up the Col di Lano?"

"But this is the very man who did it," was the reply. "That's what he got that blue ribbon on his chest for. He's done the same sort of thing three or four times since. Want to talk to him?"

Time was short that afternoon, and

I had only time for a handshake and to hear a modest explanation from the victor, of the easy way in which his team had won from men who were supposed to give far more attention to athletic contests than did the Italians.

"Pulling the gun is much like pulling the tug-of-war rope," he said; "and pulling the gun over the mountain we have now done for two year. Where the Tommy come from in France, they pull the gun with tractor or with horse. Here it is the man who must do the pull. To pull the rope is the best thing we do. Now when we come to box with the fist—just look at my eye—it is much another story. Last night a little Tommy half my size knocks me down five times, and I only hit the air always, not him."

Three days later, sitting under the lee of a cliff where a western spur of the Carso slopes down to the silver Isonzo, I had an hour's chat with V., whose name, according to Italian army regulations, I am not permitted to give. Purged of the picturesque mining-camp profanity (which is the invariable legacy of every "Americano" who comes back to Italy from the West), I use his own language as nearly as I can set it down.

"I was enough of a kid when I went with my father and mother from Genoa to Pittsburgh so that I had a good chance to learn English proper in the schools, 'stead of in the shops or on the streets, as most Italians have to. I wasn't very large for my age, but I was fair to middling hefty and shifty on my feet. Scrapping came natural to me, which was lucky, for when I set out to lick every kid that called me 'Dago,' I began on a pretty big order. It was still unfinished when I left school and went to work. I got slower and slower in getting round as I began to pile on muscle, and I suppose that's the reason I never took to boxing.

"I drifted West from job to job, until I hit the Coeur d'Alene lead camps of Idaho, and there the good wages, both 'bove and below ground, held me for a while. Before long I began to win one and two-handed drilling contests, and heavy lifts and bouts of heaving the stone, and such like, but it was not until the day I let one of my mates put a block of quartz on my chest and drill a hole halfway through it that one of the dance halls made me a bid to pull off some drilling stunts on the stage. First I did it just on Saturdays and Sundays, for five dollars a night, but soon I began to work up a regular turn and put more time to it. When a Butte manager offered me a hundred dollars a week and expenses, I chucked up my job and went on the road. By a funny chance, one of the last stunts I put on before I came back for the war was to hang by my legs from a pair of rings, lift a machine gun with my teeth and fire a few rounds of blanks from it.

"I was making good money when Italy came into the war, but it didn't need the cable from my father—he and my mother, with more than enough to live easy on for the rest of their lives, had gone back to their old home in Belluno some time before—to make me chuck it up and get away from Philadelphia with one of the first shiploads of reservists. I had never done any mountain work, but it was the fact that my family was living in an Alpine valley that made me try to get into the Alpini. It was the proudest day of my life when I was passed and got rigged out in my new uniform.

"I never was, and never will be, much of a climber, and it was because a strong back was better than a light foot in the mountain-artillery branch of the Alpini that I was put into that. I took to the work from the get-away, and the finest thing about it was that it gave me a chance to know my own people, and the better I knew them the more I liked and admired them. Most Italians returning from the States have a way of feeling and acting pretty superior when they get back to the old country, and I confess I was pretty much that way myself at first. But, believe me, it was the bunch here that was showing me how to do things from the start, and I've been open to learn right along ever since.

"Of course, when it came to hitting a drill, or doing anything in a mining way, I had them all beat easy enough, and—except for a few stunts in tight places—it has been in that kind of work that I've probably been most worth my grub. But it's the stunts you want to hear about, is it? Well, about the commonest one has been to crawl under a busted *camion* and act as a 'human jack,' or to pull out mired mules, or set up overturned carts. In a narrow place, one man, if only he's strong enough, can often do more than three or four. One of my first stunts was likewise the craziest, and also the worst fizzle—this probably because I acted on my own first fool hunch, 'stead of sitting down and figuring it out, as this experience learned me to do ever since.

"'They tied his legs and helped put him across my neck, the little fellow acting fine about it all the time, just as if he knew what I was trying to do. They gave me a cheer as I humped off, and all was lovely till I hit a place where the snow wasn't very hard.'"

"It was up on a mountain in the Trentino, during the first winter of the war, that a fine little mule—really not more than a good-sized donkey—that I was more than fond of on account of its good sense and manners, fell down and slipped a tendon in its shoulder. It was not a bad hurt, and a month's care in the Blue Cross hospital in the valley would have brought him round all right. But because the *teleferica* would not take over a hundred kilos, while the mule weighed twice that, and because he could not walk down the trail on his own legs, my major decided there was nothing to do but shoot him.

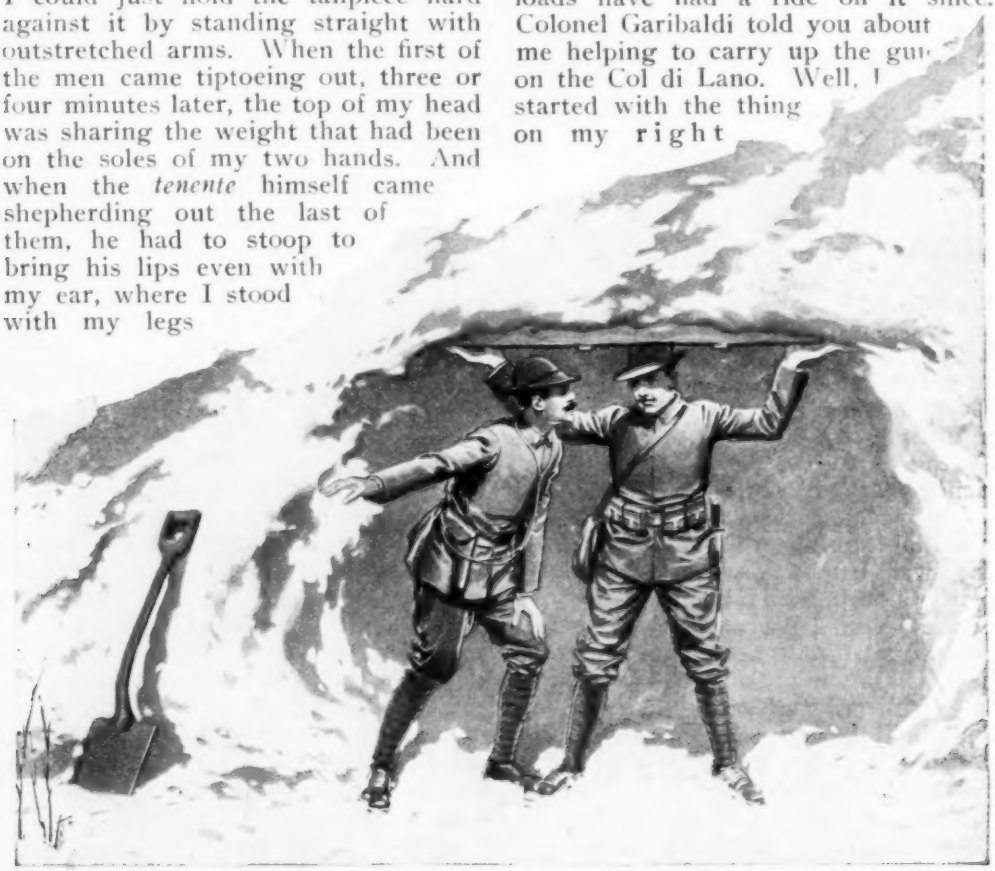
"Because I knew that I could carry the poor brute easily enough on the level, I figured that there was no reason why I couldn't do it downhill, and I've always thought I'd come pretty near to getting away with it if the footing had been solid. They tied his legs and helped put him across my neck, the little fellow acting fine about it all the time, just as if he knew what I was trying to do. They gave me a cheer as I humped off, and all was lovely till I hit a place where the snow wasn't packed very hard. I only went in halfway to my knee, but it was enough to spoil my balance, and over the side we went, mule and all. The slope was hard crust with about a one-in-two grade. I managed to claw myself to a stop in about 50 meters, and the mule could have done the same if his feet had been free so he could sprawl. As it was, the poor little devil got to rolling, and went right off over the edge of a cliff with a half-mile straight drop. When I got back, the major said he was going to make me carry up a couple of hundred kilos of meat for the dogs in place of that I had thrown away, but it must have been a joke, for he never said anything about it again.

"It was over in the Dolomites last winter that I had a rather ticklish stunt

set for me. We were digging a tunnel through a couple of hundred meters of snowslide on one of the main roads, when the *tenente* who was bossing the job noticed that the snow was starting to settle from the sun, and that the portal was almost ready to collapse. There were a couple of dozen men at the breast of the tunnel, shoveling the snow into sledges to be hauled out with mules, but these the *tenente*—being an old Alpino—was afraid to shout to for fear the vibration of his voice would start the whole slide moving. 'I'm going in to bring them out,' he said to me. 'It won't start to fall inside. All I want you to do is to take the tailpiece of that *camion* and keep the portal from caving till we are all clear.' When he ducked out of sight, the roof of the tunnel had settled so that I could just hold the tailpiece hard against it by standing straight with outstretched arms. When the first of the men came tiptoeing out, three or four minutes later, the top of my head was sharing the weight that had been on the soles of my two hands. And when the *tenente* himself came shepherding out the last of them, he had to stoop to bring his lips even with my ear, where I stood with my legs wide apart and my neck and shoulders hunched up under the door.

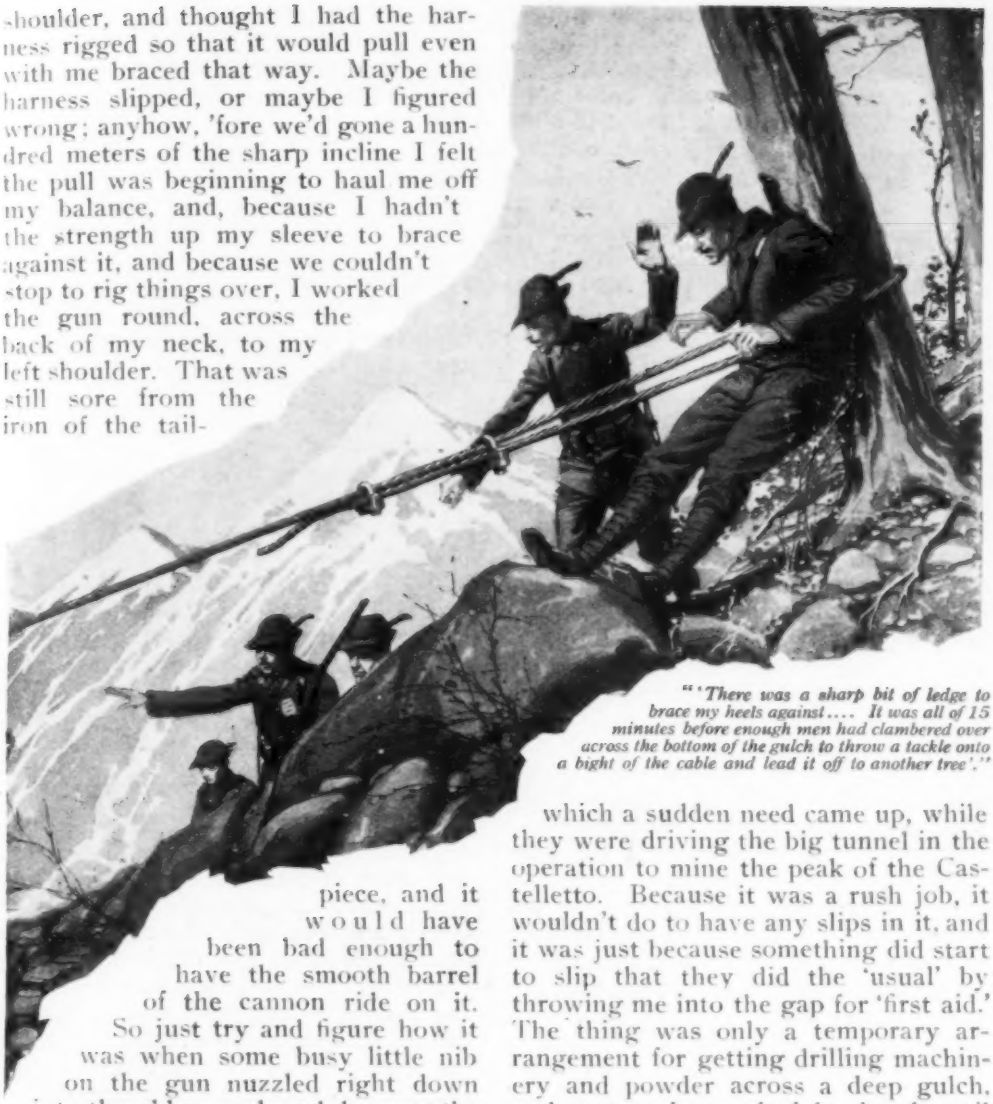
"'V.,' he said quietly, 'it won't do to move until they've put some props under that thing. They're sawing some now, and I'll wait here with you till they come.' And wait he did. I had been flattened down three or four inches more before two sections of pine-tree trunk had been shoved in to take the weight, and it was not till I got outside that I found that a piece of hardware on the tailpiece had bored a hole an inch deep in the muscle of my left shoulder. The tunnel caved in all along within 20 minutes, and we had the whole thing to dig over again when the snow had set.

"Most of that hole is there yet," he went on, hunching his shoulder with a rueful smile, "for two or three other loads have had a ride on it since. Colonel Garibaldi told you about me helping to carry up the gun on the Col di Lano. Well, I started with the thing on my right



"'"I'm going in to bring them out," he said to me. "All I want you to do is to . . . keep the portal from caving till we are all clear."'"

shoulder, and thought I had the harness rigged so that it would pull even with me braced that way. Maybe the harness slipped, or maybe I figured wrong; anyhow, 'fore we'd gone a hundred meters of the sharp incline I felt the pull was beginning to haul me off my balance, and, because I hadn't the strength up my sleeve to brace against it, and because we couldn't stop to rig things over, I worked the gun round, across the back of my neck, to my left shoulder. That was still sore from the iron of the tail-piece, and it would have been bad enough to have the smooth barrel of the cannon ride on it. So just try and figure how it was when some busy little nib on the gun nuzzled right down into the old wound, and, because the pull from the rope was now coming exactly right for my 'center of gravity,' had to be left to make a stirrup of it all the way. You bet your life Colonel Garibaldi was right when he said I was laid up in the hospital. If there was any way of dodging it, I haven't put a load on that shoulder since, though once or twice, when it was the only one that could be brought to bear something that *had* to be lifted, it has had another dose of it.



"'There was a sharp bit of ledge to brace my heels against.... It was all of 15 minutes before enough men had clambered over across the bottom of the gulch to throw a tackle onto a bight of the cable and lead it off to another tree'."

"I had a pretty stiff little job in connection with rushing up a *teleferica*, for which a sudden need came up, while they were driving the big tunnel in the operation to mine the peak of the Castelletto. Because it was a rush job, it wouldn't do to have any slips in it, and it was just because something did start to slip that they did the 'usual' by throwing me into the gap for 'first aid.' The thing was only a temporary arrangement for getting drilling machinery and powder across a deep gulch, and was to be worked by hand until they could get hold of an engine. We got the cables thrown across all right—nine-tenths of the battle on a single-span line of this kind—and had the ends made fast to the last of some little scrub pines that straggled up from the top of the timber line. The next thing to do was to make permanent 'anchors' by fixing the ends at the bottom of holes blasted in the rock and covering them with eight or ten tons of boulders held together in a crib.

"Another Alpino and I were on guard at one of the cable ends when a

jerk from the other side of the gulch—caused by dumping boulders into the 'anchor' crib—started the roots of our little pine tree to tearing loose from the rock. I hollered for them to slack the cable, and they replied it couldn't be done without hoisting all the boulders out of the crib, a half-day job. If the end of the cable broke loose it meant anywhere from two to four days to get it up again, and so it was up to my comrade and I—we were alone on that side of the gulch—to hold the thing until help arrived. We first tried to do this by grabbing the cable in our hands, but it was too greasy to give us any grip. Then we tried to prop back the pine tree by bracing our shoulders against it. This was better, but our force was mostly lost because we had to push 'angling.'

"The roots were still giving slowly, and it looked as if the thing was all off, when my comrade—who was quicker in the head than me—started to crawl inside the loop where the cable ran round the pine, so that he could get his back square against the center of the trunk itself. I savvied the game in a wink then, and because I knew he wasn't stiff enough in the back to stand the strain without crumpling up, I yanked him out by the scruff of the neck and wriggled in myself. It was a tight squeeze, forcing my shoulders through the taut cables that made the loop, but once I got there it was just as if the thing had been rigged to order. There was a sharp bit of ledge to brace my heels against, while the hollow between the muscles of my back just settled nicely over the bulge on the only smooth length of the trunk of the tree. It was all of 15 minutes before enough men had clambered over across the bottom of the gulch to throw a tackle onto a bight of the cable and lead it off to another tree. I was all cramped up into a ball like a new-hatched chicken by that time, but it never occurred to me—till one of the boys who pulled me out and was pounding the knots out of my muscles said I ought to reckon myself dead lucky that the cable hadn't snapped me across the gulch—that, if the tree had come loose in spite of my propping against it, the loop would have taken me right over the edge with it.

"I said that piece of pine trunk I braced against was smooth. So it was—comparatively. But the fact remains I had a reverse pattern of its bark down the middle of my back for the next month.

"The last time I had a stunt of this kind to pull off was in real action. It was on this front, and in connection with the big attack of two months ago, they were using a lot of picked Alpini to help throw some pontoon bridges across the upper Isonzo. Where I was working we already had plenty of bridgehead on the other side, with a little wooden bridge running across under a cliff where it was almost out of enemy fire. The pontoon bridge I was working with was also fairly safe as far as the boats themselves were concerned, but the approach to it from our side was under fire, and a cracking hot one, too. At last a shell cut the main cable holding the near pontoons, and a dozen of us were rushed out to try and keep them from being carried off downstream. I got a hitch with the loose end of the cable round my waist (just like a tug-of-war 'anchor' does), and the rest of the boys tailed on ahead of me. Inch by inch we hove the boats back to their place, and by the time they were all even again, I had backed up to a point where I was just under the cover of a jutting ledge. But no such luck for the rest of the boys. Just then a shell came that blew the first half dozen to bits, and floored all but the last two or three of us. But by now I was settled back, straight out from the rock my heels were set against, with every ounce of me heaving just where it was needed. I didn't give an inch when the others were blown off the cable, and by the 'feel' of the pull I knew that I had enough up my sleeve to do the needful alone. So I hollered to my captain not to send any more men out there where the shells were busting; that I was good

to see the thing through on my lonesome. They had a length from the anchored end of the cable knotted on to the hitch around my waist within five minutes, but I could have stuck it for half an hour in a pinch.

"They seem to think it was quite important that that bridge didn't get away," continued V. after a pause; "and now I hear that I am soon to have another of these little blue ribbons with a star on it for my part in stopping it. Well, I suppose a row of them looks pretty nifty strung on the chest, but, if this kind of thing is going to keep up much longer, I'm not sure but I'd like to wear them on my back. I've felt the need of a pad there every time I had a stunt on, and—well, in a game like this, every little helps, you know."

"'Just then a shell came that blew the first half dozen to bits, and floored all but the last two or three of us. But by now I was settled back, straight out from the rock my heels were set against, with every ounce of me heaving just where it was needed. I didn't give an inch when the others were blown off the cable, and by the 'feel' of the pull I knew that I had enough up my sleeve to do the needful alone.'"

MACHINE SANDPAPERS STAGE IN BIG MOVIE STUDIO

To keep the stage smooth and in good condition at one of the large moving-picture studios, an electric-driven sanding machine is used. At opposite ends it is provided with adjustable rollers about which sandpaper is tightly drawn. These revolve in opposite directions and are raised and lowered by means of a lever. As the machine travels slowly back and forth across the stage, smoothing the flooring, strong suction force carries the dust to a bag at the front. With this equipment one operator does the work of many men.

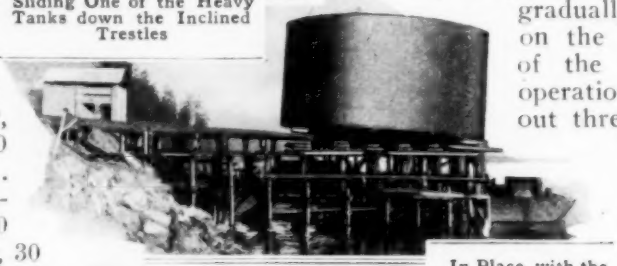
Sanding Machine at Work Smoothing the Surface of Part of the Stage That is Cleared of Sets

BARGES CARRY BIG TANKS LONG DISTANCE BY WATER

Interesting methods were employed a few weeks ago in moving three 70-ton oil tanks intact over water from Bamberton, on Saanich Inlet, Vancouver Island, to a point on the Powell River, more than 100 miles north. The steel containers, each 60 ft. in diameter, 30 ft. high, and of 15,000-bbl. capacity, were placed on barges and towed through the Strait of Georgia, past Texada Island, to their destination.

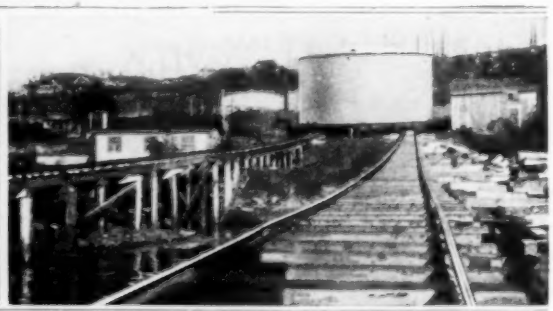
It was the matter of loading the tanks on the scows, rather than their actual transportation, that presented difficulties. The site at Bamberton was several hundred feet from the shore at a considerable height above low water. Two parallel trestles, to serve as ways, were built to a point 150 ft. beyond the shore line. The outer 60 ft. of each consisted of a segment arranged to be lowered in sections. When a tank was drawn into place, a barge supporting a timber superstructure, about 13 ft. in height, was moved between the trestles. High tide caused it to raise the tank above the trestles so that the top sections of the latter could be removed. As the water subsequently receded, the tank was gradually dropped back on the lower sections of the trestles. This operation was carried out three times before the tank reached a low enough level for the barge to pick it up at high tide. The Powell River site is about 600 ft. from the shore line. To reach the point a double-tracked incline was built at a 10-per-cent grade. By again utilizing

Sliding One of the Heavy Tanks down the Inclined Trestles



In Place, with the Scow beneath It, Waiting for High Tide to Raise the Tank above the Staging

Lifted Free by the Scow, Enabling the Top Sections of the Trestles to be Removed



At the Left One of the Tanks, Saddled to a Barge in Tow, is Starting on Its Long Journey. The Other Picture Shows It on the Double-Tracked Incline at Powell River

the tides, the tanks were placed on carriages and pulled by an engine to the top of the incline.

GERMAN-LANGUAGE SCHOOLS INVESTIGATED

That not only the German language but German ideals are nourished by a surprisingly large number of foreign-language schools in Nebraska is shown in a report recently issued by the council of defense for that state. The document states that there are 262 foreign-language schools scattered through 59 counties, in which it is estimated that 10,000 children receive instruction in foreign languages, chiefly German. The county superintendents of these counties state that in only a few instances do these schools—less than two per cent of whose teachers are certified—give the equivalent of the eighth-grade work of public schools, and that eight years' attendance fits the pupil for about the sixth grade in the public schools.

In a number of districts public schools have been abandoned because of the parochial rivals. More than 100 of these private schools lack an American flag. In certain ones the German national anthem is sung, while the American national anthem is not sung in about 100 of the German-language institutions.

FARM TRACTOR IS EQUIPPED WITH NOVEL REAR WHEELS

Spring-pedrail driving wheels give a measure of distinction to a new farm tractor. Increased tractive effort is supposed to accrue through their use. Instead of being pivoted in the familiar manner, the cleated members are held in place by stanch coil springs. One of these is attached at one end of each pedrail, while a spur, which bears against a roller mounted adjacently between the inner flanges of the rim, is fixed at the other extremity. Such an arrangement gives flexibility and allows the wheels to run on their tracks smoothly and without scraping and flipping the soil. Furthermore it permits 40-in. wheels to be used instead

Instead of being Pivoted to the Rims in the Customary Way the Pedrails are Held in Place by Stanch Coil Springs

of 5-ft. ones of conventional design, which means a lower center of gravity for the tractor and therefore permits a correspondingly narrower tread with its attending advantages.

TRAFFIC POLICE SHELTERED DURING COLD DAYS

Portable glass-walled sentry boxes were used during severe weather some weeks ago to protect traffic policemen on duty at street intersections in Jersey City. They were placed where they afforded their occupants unobstructed views of the converging thoroughfares and were plainly visible to drivers. In this way the men did not suffer needlessly from exposure and were able to execute their functions properly.

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NEW EYE-BATHING DEVICE MADE LIKE GOGGLES

The use of a recent invention that fits about the head like a pair of goggles makes the thorough bathing of inflamed or infected eyes comparatively easy. The device consists of two close-fitting eye cups with glass fronts, each connected with inlet and outlet rubber tubes. Through these the lotion is allowed to flow from an elevated reservoir down in front of one or both eyes and thence into a basin.

SWEETHEART SERVICE FLAG FOR SAMMIES' AFFIANCED

A special service flag has been brought out to meet the controversy whether it is proper or not for a young woman to display one of the regular emblems in honor of the soldier to whom she is engaged. It is called a sweetheart service flag and consists of a red heart, with a blue star in the center, on a white field.

GLASS TUBES FOR SCIENCE WORK MADE IN NEW WAY

Glass tubes of exact dimensions, such as are needed in laboratories, are being made, according to reports from Germany, by fitting a core of the desired size into a somewhat larger tube. The cross section of the core may be cylindrical, conical, or many-sided. The air is withdrawn from the tube, which is sealed about the core, and it is heated externally while being turned on its axis. When air pressure has caused the glass to press tightly against the sides of the core, the latter is removed and the tube is complete.

SAFETY DEVICE ADJUSTS CAR'S SPEED TO ROAD

A safety device for automobiles, the operation of which is dependent on road conditions rather than on exceeding a certain speed limit, consists of a small cylindrical case that attaches to the front of a car and contains a weight normally held in a neutral position by an adjustable spring. A severe bump or shock, due to excessive speed or a bad roadbed, will throw the weight out of neutral and, by means of a connection with the throttle or ignition, cause the car to slow up temporarily. A recording attachment is provided which enables an owner to detect abusive use of his car by others.

PARCELS CARRIED HOME MARKED WITH STAMP

To induce customers to have fewer parcels delivered, a retail store attaches a sticker, illustrated herewith, to each package which the purchaser carries home. The legend, "I'm Carrying It to Do My Bit," tells its own story. The patriotic lesson is also implied in the picture of the soldier carrying a rifle. The stickers have done much to lessen delivery costs.

TRAIN WITH FROZEN BRAKES MEETS FATE IN MOUNTAINS

Disaster abruptly concluded the race of a runaway freight train in the White Mountains of New Hampshire some weeks ago. Heavily loaded and with its brakes out of commission because of the cold, it roared downgrade at a mile-a-minute clip through the famous Crawford Notch. A sharp curve was the graveyard for the locomotive and its 30 cars. Twisted and broken steel, splintered wood, and scattered merchandise littered the snow. Three members of the crew—the engine runner, fireman, and a brakeman—were killed.

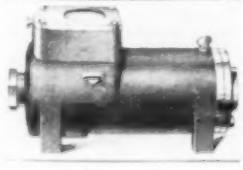
PHOTOS COPYRIGHT, INTERNATIONAL FILM SERVICE

Graveyard of a Runaway Freight Train in the White Mountains: The Result of Striking a Curve at a 60-Mile Clip

Laying a Track to the Side of the Ill-Fated Locomotive to Effect Its Removal: Débris of the Wreck Is Visible Above

METER REGISTERS FREE AIR USED BY PNEUMATIC TOOLS

In many mining districts the practice of one company supplying others with compressed air for the operation of drills and hoists has become somewhat common. Therefore it is interesting to note that a meter, designed to measure the volume of free air delivered to individual consumers, has been so constructed that it automatically compensates for pressure variations and registers much the same as a gas or water meter. The device is built on the principle that the speed of the air passing through it depends upon pressure and that the volume of free air consumed by a tool is proportional to the speed with which the air flows to its cylinder.



¶ Government officials in Peru recently opened a wireless station in that country at a point approximately 2,000 miles south of Panama. The new station can receive and send messages to Argentina, Chile, and most parts of Brazil, and has even caught signals from the United States.

KNITTING TOOLS ARE ADDED TO FIREMEN'S EQUIPMENT

Knitting is cast aside in more stations than one when fire alarms sound

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These Particular Fellows are Knitting for the Rainbow Division, Now in France, and Make Sweaters, Hose, and Wristlets of the Wool That Friends of the Division Contribute

in New York. That is because many of Gotham's firemen are knitting for Pershing's fellows. Fire laddies have a universal reputation for doing things well when they undertake them. It isn't surprising therefore that they spend but little time in acquiring the knack of purling and binding off.

¶ Among the war souvenirs sold in this country for the benefit of relief work, which have an especial appeal, are rings set with bits of glass from the windows of desolated Rheimscathedral.

NEWFOUNDLAND'S SACRIFICE WINS RANK OF DOMINION

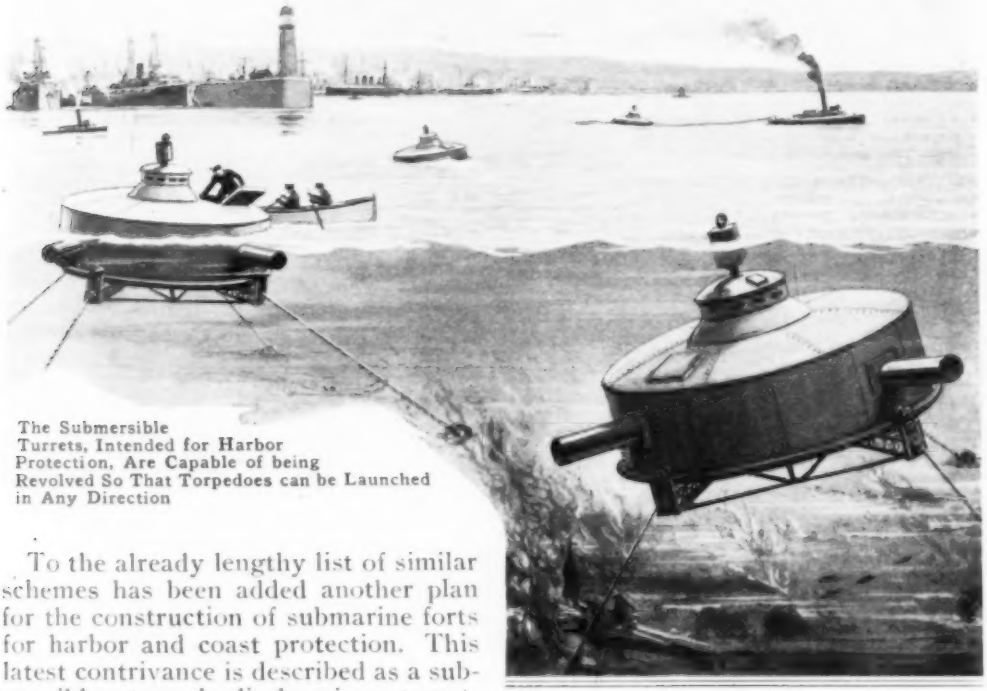
One of the brightest pages in the history of the British colonies is that dealing with the heroic sacrifice of Newfoundland in the present war, and in recognition of that service this, the oldest of the British colonies, has been given the title of the "Dominion of Newfoundland." The sturdy people of this land have given more than 10,000 men to the war, including those in the Newfoundland Regiment, the Royal Naval Reserve, and the forestry corps. It is said that the new name will not materially alter Newfoundland's government, which has been very liberal in form.

NOVEL CARS CONNECT LINES SEPARATED BY HILL

Those who have not visited Duluth, Minn., or one of a few other cities where similar transportation equipment is used, may be struck by the appearance of a double-track cable line that transfers passengers between the top and bottom of a steep hill. An elevation of 503 ft. is negotiated in a distance of eight blocks by two small cars that are equipped at one end with high trucks that compensate for the grade and keep them reasonably level. They are controlled in unison from the top of the hill and spaced so that each is at a station platform when stopped to receive or discharge passengers at intermediate points.

Left: Overlooking the Lake and Harbor from a Point near the Top of the Cable Line. Right: The Two Cars are Operated in Unison and Spaced So That When Stopped Each Is at a Station

FLOATING TURRET IS FORT FOR HARBOR DEFENSE



The Submersible Turrets, Intended for Harbor Protection, Are Capable of being Revolved So That Torpedoes can be Launched in Any Direction

To the already lengthy list of similar schemes has been added another plan for the construction of submarine forts for harbor and coast protection. This latest contrivance is described as a submersible torpedo-discharging turret, and like others may be raised to the surface of the water or sunk to a safe depth below it, as the occasion requires. Obviously there is no propulsion mechanism, for the device would be towed, when moved, and then anchored. The floating turret is circular in form and mounted on a supporting framework to which the anchor lines are attached. Such an arrangement permits it to be rotated about its vertical axis so that its torpedoes may be launched in any direction. Cheapness of construction, as compared with submarines and other war vessels, and its safety to friendly shipping, as contrasted with mine fields, are the chief advantages cited.

¶ In French cities where our soldiers are arriving in large numbers fountain pens are in great demand, especially those of American make.

MEDAL TO AMERICAN RELIEF OF BELGIUM ESCAPES HUNS

One of the suppressed medals, struck by the Belgians in 1914 as a token of the stricken nation's appreciation of efforts made by America to ameliorate its suf-

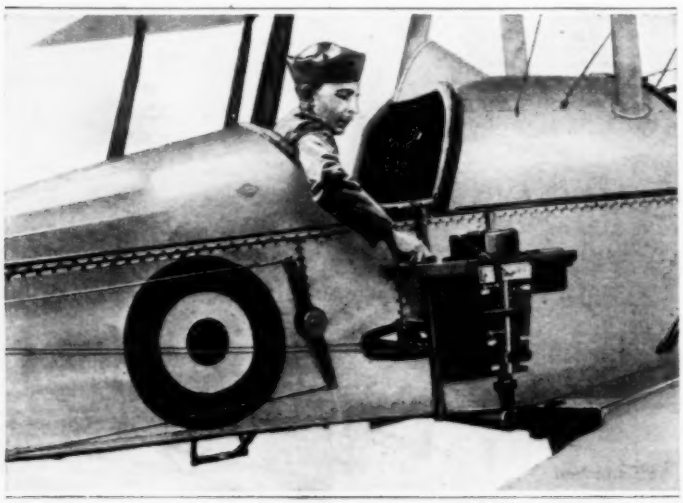
The Profiles of Belgium's King and Queen Ornament the Obverse of the Medal. Columbia with Grain, and Destitute Belgium, Represented by a Family Group, Appear on the Reverse Side

fering, has reached our shores. Only a few of the pieces escaped German confiscation, it is understood.

EFFICIENT CAMERA USED ON SCOUT PLANES

By H. A. BRUNO, *R. F. C.*

PHOTOGRAPHY plays an important part in air reconnaissance. The ordinary methods of observation have given way to aerial photography, because it is a better way to obtain detailed and accurate information. Photographs are usually taken in the air by the pilot and seldom by the observer. There are several kinds of cameras adapted for aerial work, but the one used mostly by the Royal Flying Corps is known as the changer type.



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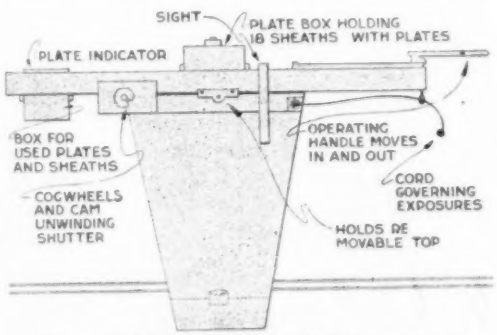
Changer-Type Aerial Camera Weighing 110 Pounds Shown Attached to the Fuselage of a British Reconnaissance Plane by Means of Specially Designed Clamps That Absorb Motor Vibrations and Landing Shocks

This camera, which weighs complete 110 lb., is fastened to the right of the pilot, outside the aeroplane's fuselage, with special clamps designed to take up the vibration of the motor and shock of landing. The bottom protrudes below the fuselage, giving a clear view below. When fully loaded, it holds 18 sheaths with plates in a box on top of the camera, as illustrated. The method of operation is simple. It will be noticed that at one end of the camera is a long handle placed on top of the frame. At the other end underneath the frame is an empty box for holding the used plates and sheaths. Assuming that the pilot is over the spot which he wishes to photograph, he pulls the cord suspended beneath the handle, and as the shutter unwinds, the picture is taken. The right hand only is used, and all that is necessary to be ready for the next picture is to push the handle in and out again to its original position. This handle connects with a slide which pushes the exposed plate inside the frame into the box prepared for it, at the same time allowing a new plate to fall into place.

Over each objective, the pilot goes through the same operation until he has used up his 18 plates. If he should by any chance lose count of the exposures taken, a glance at the plate indicator will set him right.

The size of the plates used is 5 by 4 in., of the type known as Panchromatic M. Enlargements may be made from these up to 8½ by 6½ in. The focal length of the lens is 10 in. Some of these cameras, however, are equipped with an 8-in. lens. With a lens of this


SIGHT
PLATE BOX HOLDING 18 SHEATHS WITH PLATES
PLATE INDICATOR
BOX FOR USED PLATES AND SHEATHS
OPERATING HANDLE MOVES IN AND OUT
CORD GOVERNING EXPOSURES
COGWHEELS AND CAM UNWINDING SHUTTER
HOLDS RE MOVABLE TOP

The Lettering Indicates the Various Points of Interest Illustrated by the Diagram

focus and a 5 by 4-in. plate, the height in feet divided by five gives, in yards, the longer side of the rectangle covered by the photograph. This is correct to five per cent. A contact print

Breaking Ground Late Last December for a Drive in Liberty Park, Salt Lake City

Scene in Liberty Park in December, 1916, Showing the Marked Difference in Weather Conditions of the Two Seasons

Moving a Handsome Blue Spruce, 50 Feet Tall and 14 Inches in Diameter at Its Base, to Clear the Right of Way of the New Drive

from a negative taken at 6,800 ft. approximates to a scale of 1 to 1,000 on a map.

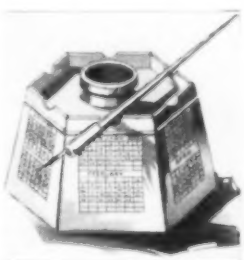
After returning to his base, the airman delivers his precious plates to the officer in charge of the photographic section, who sees that they are developed and printed immediately. Later, from the 5 by 4-in. negatives, enlarged prints are made to whole-plate size. It is from pictures such as these that a general idea of the changes made from day to day back of the enemy lines are noted.

SALT LAKE CITY IMPROVES ITS BIGGEST PARK

The largest outdoor recreation center in Salt Lake City, Liberty Park, whose area is 100 acres, has been undergoing important improvements of late, one of them being the opening of a splendid drive, 660 ft. long, through a tract that was formerly occupied by trees and buildings. The work of breaking the ground was in progress late last December and, fortunately for those concerned, the weather was in marked contrast to the December previous. At the close of the year 1916 the ground was covered with 3 ft. of snow, while last December there was no snow whatever and the diggers worked in their shirt sleeves.

ADVERTISING NOVELTY FOR INKWELL

An advertising novelty, consisting of a six-sided cardboard case with an opening in the top, is designed to fit around an inkwell. On the sides are printed the months of the calendar and the advertiser's card. Notches in the upper edges prevent a pen laid across the top from rolling off. When not in use the case folds flat.



NONSLIP CHAINS MADE FOR FOOTWEAR

Nonslipping chains for use on icy pavements have recently been adapted to footwear. Sets of these metal-linked protectors have been devised which pass around the point of the shoe, or rubber, and under the sole, being held in place by a strap around the heel.

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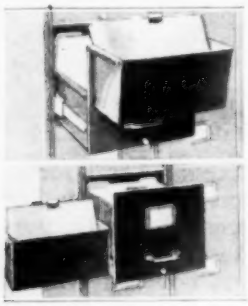
HANDY DISTRIBUTING CASE NEW FILING ACCESSORY

A new office accessory of convenience in arranging matter alphabetically, or otherwise, preparatory to filing, is a small metal case, having labeled guides, which is hung at the end or side of an opened filing drawer. When in this position correspondence can be easily transferred from it to the permanent container. It can be used to hold matter referred to frequently.



OFFICER TELLS SAILING DATE AND IS ARRESTED

Recently the War Department authorized the arrest of a young officer who had revealed to relatives the name of the vessel on which he was about to sail and date of departure. These members of his family sent him a telegram in care of the vessel in question, and so might have placed at the disposal of the enemy information that would have endangered the entire boat load. The department is rigidly insisting that information of this character cannot be given out under pain of severe punishment.

A Self-Service Grocery: Each Customer Enters through the Turnstile at the Left and Takes One of the Baskets behind the Rail, in Which He Places His Selection of Packages. Arriving at the End of the Circuitous Aisle, the Purchases are Wrapped and Paid for at the Counter Shown in the Center

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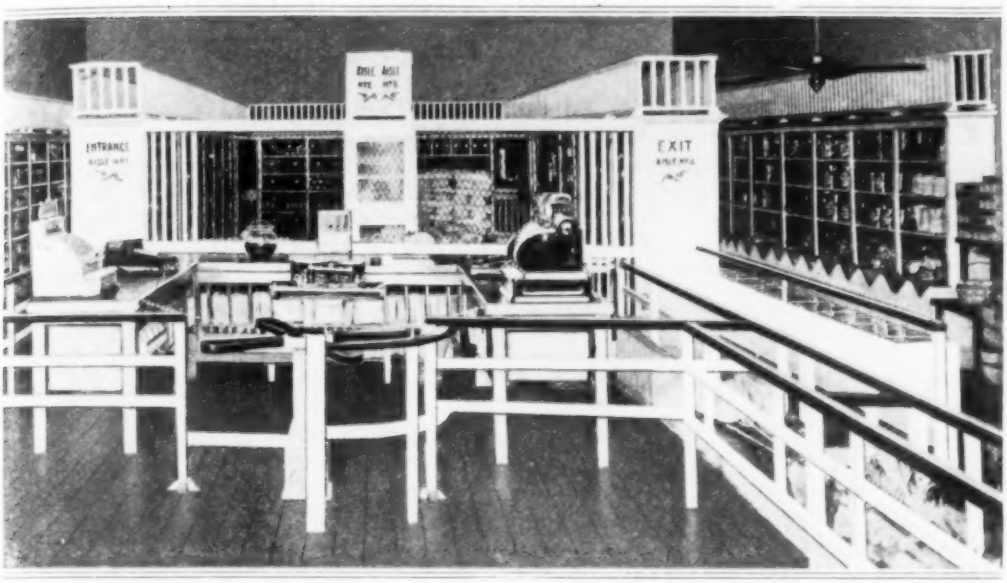
SELF-SERVICE GROCERIES HAVE PATENTED PLAN

Groups of self-service grocery stores are being established in this country, in various cities, the general plan of which has been patented. All of the stores have several distinctive features in common. Customers enter a lobby from which they pass through a turnstile and beside a rack, containing baskets in which articles selected from the shelves can be carried until brought to the exit. The prospective purchaser is required to pass the full length of a circuitous aisle, on either side of which are special cases and racks, some of them quite ingenious, containing goods very attractively displayed. The arrangement of the fixtures affords about four times the display area found in an ordinary store, and brings the customer in close contact with practically the entire stock.

The prices are indicated on round tags suspended from the shelves. Access to goods in the refrigerators is gained through narrow self-closing doors in two sides of these low-temperature cases. At a counter near the exit turnstile the selected packages are wrapped by an attendant, and the customer pays the amount of his bill to



the cashier. One week's record for nine stores shows that the average store expense was 3.12 cents on each dollar of sales.

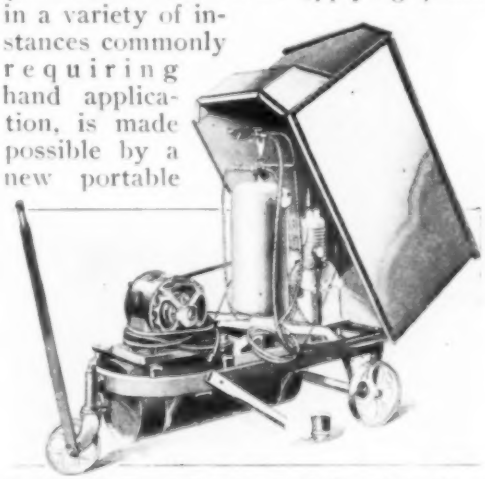
BRIGHT-COLORED GARMENTS NOT WANTED IN FRANCE

Bright-colored garments are no longer accepted by the Red Cross in this country for shipment to the needy in France and Belgium. In times of peace, neither the children in those countries nor their parents commonly wear bright-hued apparel, and now, with almost the entire population in mourning, such articles of dress are quite distasteful. The garments that the Red Cross is making are in somber shades, such as browns, dark blues, and grays. Those made of red, green, or yellow goods, for example, cannot be sent to these countries. All apparel is now being made according to patterns which follow the native costumes as closely as possible, and is of standard material.

¶ Smoke screens are being used by aeroplanes raiding England, it is said, which make the work of anti-aircraft guns more difficult because the smoke takes on the shape and color of clouds.

PORTABLE PAINT SPRAYER PROVIDED WITH COVER

The convenient use of the compressed-air method of applying paint in a variety of instances commonly requiring hand application, is made possible by a new portable air-brush painting outfit. It is mounted on three low wheels and consists of a small motor that drives an air compressor, also an air tank, paint reservoir, and an air brush, together with connecting tubing. A metal hood is provided with which the outfit can be completely covered.



Portable Air-Brush Painting Outfit Provided with an Electrically Driven Air Compressor: Similar Outfits are Equipped with Gasoline Engines

UNSUNG HEROES

By E. T. BRONSDON

PART I—The Ammunition Runner

FRITZ does not consider a trench or set of trenches lost until at least two hours after the allied troops have taken it. In two hours much can happen. The two hours of grace represent the time Fritz has found French and British troops consume, under ordinary conditions, in getting lines of communication established. Until this is done, the captors are very much at the mercy of a strong counterattack.

Southeast of Craonne, recently, a typical example occurred. A surprise attack was carried out by three battalions of French troops. Shortly after eight in the evening was the time chosen, an hour when the silent cut-throat work in No Man's Land usually is just beginning.

The attack was made in three waves, for at this point the Germans had constructed three lines of elaborate trenches—first, their half-shielded fire-trench; second, the roofed reserve trench, and third, the luxurious quarters of the officers—with another set of three, 80 yards farther back.

Two waves of French bombers, machine gunners, bayonet fighters, and *tueurs*—as the French frankly call their "trench cleaners"—succeeded in capturing the first two of the three lines after a sanguinary conflict lasting 25 minutes. The third wave, however, met a hastily gathered reserve of *stoss truppen* whose presence was not expected. This third wave, planning on having a rather easy time of it routing indignant German officers out of their comfortable beds, and here and there snatching up a souvenir, was not as strong as the two preceding waves. The plan had been to mass all the remaining strength of the three waves in the last trench taken, and then wait for reinforcements, but the German *stoss truppen* spoiled all the fun. These desperate fighters repulsed the third wave with heavy loss.

This put the successful attackers in an unenviable predicament. No chance was given them to dig another trench. Even refacing the German reserve trench—now the French fire trench—was impossible, for Fritz—and an especially demoniac kind of Fritz, too!—was swarming in another trench only 12 yards away. Every second or two, masses charged down the traverses, wide open, of course, except for hastily erected breastworks of piling torn off the German dugouts, and sandbags from the old parapet. These could be repelled by machine-gun fire, and were repelled for some time.

But the Boches were not the chief cause of worry! Carefully and methodically according to custom, the German artillery had set a box barrage around the captured sector, inclosing it on three sides and rendering the lines of communication exceedingly difficult to establish. Incessant rains of star shells kept the sky aflame, and lighted the waste that had been No Man's Land with a constant flicker, punctured by a staccato line of huge flares where the barrage kept the dead line. The thought of every officer and poilu, trapped there with the enemy ravenous and vengeful in front, and a solid wall of shrapnel shells and "H. E.'s" bursting behind, was, "Will they be able to get ammunition to us?"

According to a French lieutenant who was in this fight and many similar engagements (Lieut. P. S. R. Jugues), the most intense moment of an attack comes, not, as many think, at the moment when one leaps over the parapet, not during the mad seconds or minutes when the bayonet attack brings foemen within arm's length, but during the terrible period of suspense that ensues when an objective is first attained. Then it is, when cartridge belts are nearly empty, when the machine gunners have practically exhausted their supplies, when the bombers have nothing but rows of empty catches on their belts, that the heart skips regular beats, and the fear of death really grows to overwhelming proportions. When one is fighting desperately there

is no time for fear, and as long as a man has weapons in his hand he devotes his whole strength of mind and body to their use; when the last cartridge is in sight, however, panic strikes into the heart.

It is at this moment that one of the most heroic figures of modern warfare—the ammunition runner—has his day.

His business is simple. He has merely to take chances of death ten times greater than the fighter in the ranks. He is not in the van when the attack starts; he waits in the shelter of the old fire trench with a comrade and a 200-pound case of cartridges.

When it is time for him to make his run, in the judgment of the officer commanding the reserves—only in the rarest instances are telephone or telegraph wires strung up to the advanced positions during these fiery moments, and during a heavy barrage the microtelephone instrument, which uses the ground as its only wire, is useless—he crawls over the parapet, seizes one of the box handles, and then with his comrade he makes a stooping run for the new trench at as fast a sprint as he is capable of.

"The barrage? He goes through it! Stumbling along over bits of barbed wire, shell craters, and human bodies, he runs straight into the deadly hail."

"Once in a while a runner wins through unscathed, of course, but he is the exception. Four out of every five are killed outright."

The barrage? He goes *through* it! Stumbling along over bits of barbed wire, shell craters, and human bodies, he runs straight into the deadly hail that the enemy is keeping around the advanced position for the express purpose of stopping him. He is the only hope of the defenders, for in a sudden attack there has been no opportunity to dig communicating trenches back, of course, and both food and ammunition has to come overland across the open. The food, however, can wait, for unless the soldier has discarded his iron ration because of its extra weight he has food enough to last him three days in his pack. The ammunition is as much a necessity as air to breathe; without it the defenders must perish helplessly.

Sometimes, as stated, the runner carries rifle ammunition. More often he is loaded with hand or rifle grenades, or machine-gun cartridges. In any of the latter instances each runner starts alone. If he is seen to fall, another runs swiftly out to him, transfers the burden, and goes on. Often as many as five men are used to get one load of ammunition across 100 yards of distance.

Once in a while a runner wins through unscathed, of course, but he is the exception. Four out of every five are wounded, and one of the four is either killed outright or dies later of his wounds.

During all the time that the sappers and engineers are working like wild men to dig sheltered communication trenches, the runner has to work. For a battalion's supply of ammunition, from 20 to 50 runners are sent out every hour.

At this Craonne attack, the box barrage was particularly deadly. The Germans had established a zone of death which did for six runners who were the first to essay the trip. Another half dozen made a run for the loads. Two of these won through; the ammunition was sufficient to stop two fierce attacks through the communication trenches. Then came another terrible period of waiting, and another set of runners tried to get across. These fell, and before their relief had time to get even halfway, the Germans tumbled them down like ninepins. The defenders came to the horrible realization that the Boches, shielded by their parapet, were picking off the runners with rifle fire in addition to the barrage.

It was a desperate condition and demanded a desperate remedy. Though the parados was lower than the parapet, French snipers by the score, and even ordinary privates, mounted to a point where they could see the German snipers. Then ensued an unequal com-

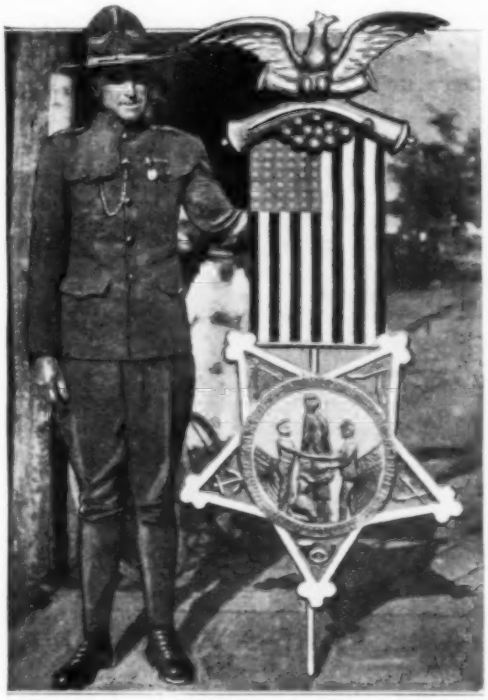
bat. The Germans had far the best of it, killing many more French than the latter did Germans. It was successful in the one respect, however, that the German snipers were kept busy, and while this was going on a few more loads of ammunition came in. These were sufficient to hold off the Germans until reinforcements arrived, when the Boches were driven from the third trench, and the unit strengthened.

CODE GUIDE FOR SOLDIER'S USE IN EMERGENCY

To make every soldier able in an emergency to receive wigwag signals, a code guide has been stamped on a piece of copper that will fit a shirt pocket. As one man watches the sender and calls out the dots and dashes, another, by tracing the grooves in the plate, can decipher the message. The start is made at the upper left-hand corner. Perpendicular lines represent dots; horizontal ones, dashes. Translation at the sending speed is easy.

SONS MAKE ENLARGEMENT OF VETERAN'S BADGE

Three sons of a Civil War veteran recently manifested their pride in their father's record by presenting him and his regiment, at its recent reunion in Madison, Wis., with a handsome enlarged copy of the Grand Army badge worn by these old volunteers. Except for the flag, which is silk, the badge is made entirely of heavy sheet metal, gilded and enameled in suitable colors. The embossing was done by beating and hammering with tools of various shapes, the upper part being made in two pieces and the lower part in three pieces. The unusual souvenir represents about 50 hours' work and was presented by the regiment to the Wisconsin Historical Society, in whose rooms it is on display.



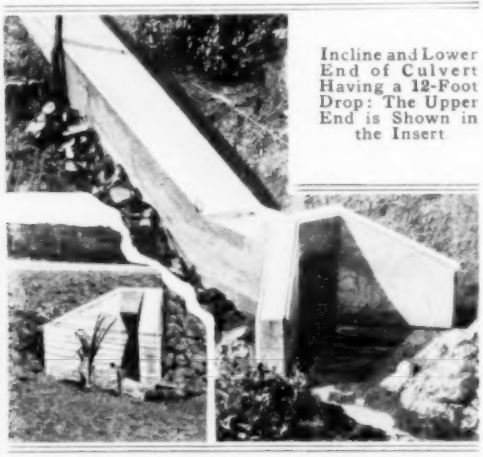
Enlarged Copy of a G. A. R. Badge Made by Sons of a Civil War Veteran and Presented to Him and His Comrades

BARREL HEAD OF NEW TYPE IS EASILY REMOVED

To prevent injury to barrels when they are opened, a new type of head so arranged that it may be removed readily without loosening the top hoops and parting the staves, has been invented. A threaded plug of generous diameter is fitted in the center, between the ends of two tapering wedges. Means are provided for unscrewing it, and after this is done, as many of the parts as desired may be loosened, by striking the sides of the barrel, and removed.

ROAD CULVERT HAS DROP OF TWELVE FEET

To meet unusual conditions at a point on the Jefferson Highway, in Decatur County, Iowa, a concrete culvert was built beneath the road which has a fall of 12 ft. 2 in., the slant being uniform throughout its entire length. The transverse dimensions of the structure are 2 by 3 feet.



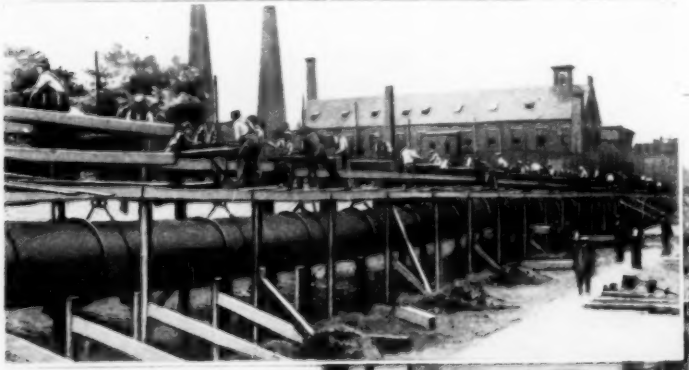
Incline and Lower End of Culvert Having a 12-Foot Drop: The Upper End is Shown in the Insert

TURKS DECIDE TO BRIDGE AND TUNNEL BOSPORUS

The Turkish government, according to dispatches, has let contracts for the construction of a bridge and tunnel between Europe and Asia at the Bosporus. This apparently indicates that Germany, Turkey's ally, is looking forward to completing another link in the Berlin-to-Bagdad railway, which is a much-emphasized feature of its dream of a greater empire. The Bosporus is about 18 miles long, and has a maximum width at the northern entrance of two and three-fourths miles and a minimum width of about 800 yards.

RAISE LARGE WATER MAIN TO MEET STREET GRADE

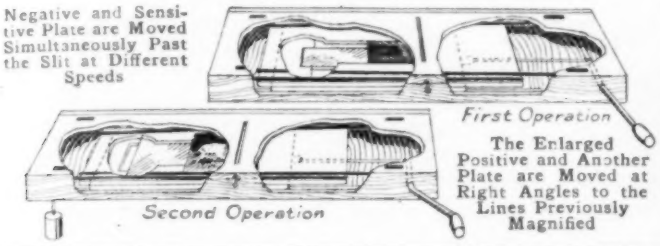
In abolishing a railway grade crossing at Somerville, Mass., some time ago, it was necessary to raise a 48-in. water main several feet to make it conform to a new street level. The work was accomplished by passing cables around each section of the pipe and connecting them with screws suspended from crossbeams supported by piling. As quickly as a part of the conduit was elevated to the proper height, heavy timbers were slipped beneath it and bolted to short uprights interspaced between the tall ones carrying the staging above. Subsequently the latter were sawed

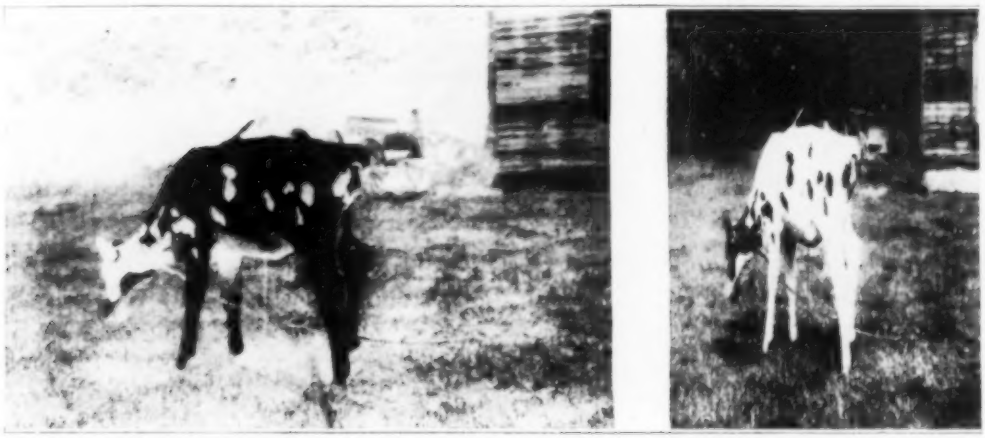


The Work in Progress: Hoisting the Big Conduit Intact to Make It Conform to a New Street Grade

The Task Completed: The Main Supported on Timbers Ready for the Street-Raising Operations to Begin

off and made to support a proportionate amount of the load. Such work is common in metropolitan subway construction, for it is the usual practice to elevate the utility conduits to facilitate operations.


Negative and Sensitive Plate are Moved Simultaneously Past the Slit at Different Speeds
First Operation
Second Operation
The Enlarged Positive and Another Plate are Moved at Right Angles to the Lines Previously Magnified



The Original Negative is Shown in the Upper Right-Hand Corner. Below It Is a Vertically Enlarged Positive. The Third Picture Is of the Final Undistorted Enlarged Negative

EASY METHOD OF ENLARGING PHOTOS WITHOUT LENS

Patent rights have of late been obtained by the originator of an interesting system for the enlargement of photographs without the use of a lens. A comparatively simple apparatus, the general character of which is made evident by the details of the process, is employed. A negative and a sensitive plate of the required proportions are moved simultaneously at different speeds past a narrow slit through which light is projected. The rate of motion of the latter plate may be two, three, or more times greater than that of the former. This is determined by the degree of magnification desired. A distorted positive transparency is obtained upon development. All of the lines at right angles to the slit at the time of the exposure are enlarged, while parallel ones are unchanged. This positive is then substituted for the original negative and the process repeated, the motion this time being at right angles to the lines magnified in the initial operation. Execution of the second step produces a negative that is similar to the first one geometrically and of the desired dimensions.

GOLD REFINERY AT OTTAWA WORLD'S LARGEST

Since the beginning of the war, according to reports, the mint at Ottawa, Canada, has handled $1,000,000,000 worth of bullion for the British government and the Bank of England. The claims are made that its recent enlargement has made it capable of treating 250,000 oz. per week by the chlorine process and that it is the largest gold refinery in the world.

MODERN CONCRETE BUILDING RAZED BY WRECKERS

When wrecking operations were undertaken on a comparatively new reinforced-concrete building at Chicago recently, persistent onslaughts had to be made with falling weights, oxyacetylene torches, sledges, fire, water, and dynamite. The architect had striven to give the structure strength and permanency. He succeeded so admirably that the floors, designed to carry a load of about 250 lb. to the square foot, failed to sag more than an inch when subjected to a pressure of 910 lb. to the square foot, as previously reported in this magazine. Even with all of the destructive agents that were employed, a large force of men spent 10 weeks in accomplishing the work, which cost approximately 15 per cent of the construction price.

Crushing Concrete and Exposing the Reinforcing Rods by Hammering a Floor Panel with the Pear-Shaped Ball of Iron

The demolition of such buildings is not frequent, and the methods employed are therefore interesting. A 1,800-lb. pear-shaped cast-iron ball was used in smashing through the floors. It was carried by a single fall line on the 40-ft. boom of a stiff-leg derrick, which gave it a sheer drop of 30 ft. Attacks were made against the center of the floor panels by repeatedly dropping the ball until its terrific impacts shattered the concrete and exposed the reinforcing rods so that torches could be used to cut them. Blows were then directed against the tops of adjacent columns so as to loosen the concrete from the rods at their bases. The machine was moved from place to place as one after another of the panels was demolished. When all but the one slab on which the derrick stood had fallen, the machine was taken to the floor below, there to repeat its work.

Wood fires were built around the bases of the interior columns and kept burning for several hours so that when subjected to streams of cold water the concrete would crack. After the rods

The Building as It Appeared at the Outset of the Wrecking Operations is Shown at the Left. The Picture at the Right was Taken at the Rear of the Structure After the Roof and Top Floor had been Removed

were cut with torches, the columns were pulled over, the beams, of course, falling at the same time. To raze the heavy columns and piers beneath the first floor, dynamite was successfully employed. The building was wrecked to make room for a new railway station.

Top: To Facilitate the Work of the Oxyacetylene Torches, Used for Cutting the Reinforcing Rods, It Was Necessary to Break the Concrete along the Edges of the Beams with Sledges. At the Side the Task is Nearing the Final Stage. The Derrick is Shown at Work at the Extreme Left

DUTCH PREVENT SMUGGLING BY STAMPING UNDERWEAR

A few months ago many Germans were found entering Holland wearing no undergarments beneath their outer clothing, whereas on their return to their own country they were well supplied with respect to underwear. To put a stop to this form of smuggling, officers at the border now stamp each German's undergarments as he comes into Holland, and any person attempting to return to Germany wearing underclothes that are not properly stamped is turned over to the authorities.

REVOLVING SORTING TABLE IN RAILWAY OFFICE

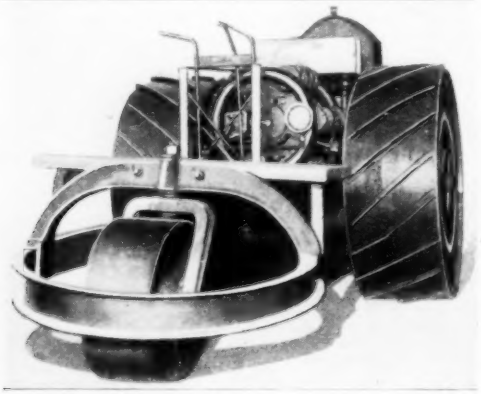
A revolving 8-ft. sorting table is the device with which clerks in the South-

Revolving Sorting Table at Which 12 Girls can Assemble 60 Sets of Circulars per Minute

ern Pacific Company's office expedite the assembling of sets of circulars issued in connection with the present tremendous railway activity. Priority orders, war-tax regulations, tariffs, etc., are placed on the table around which 12 girls are seated. As it revolves each girl makes up the needed sets, the 12 assembling 60 sets per minute and handling 30,000 pieces of matter per day.

HIGH EFFICIENCY CLAIMED FOR NEW FARM TRACTOR

Hydraulic transmission is one of the outstanding features of a three-wheel farm tractor that has lately come to



End View of Hydraulic Tractor, Showing the Seat, Gas Tank, and Hood Removed: The Weight of the Machine and Its Drawbar Pull are Said Each to Be 6,000 Pounds

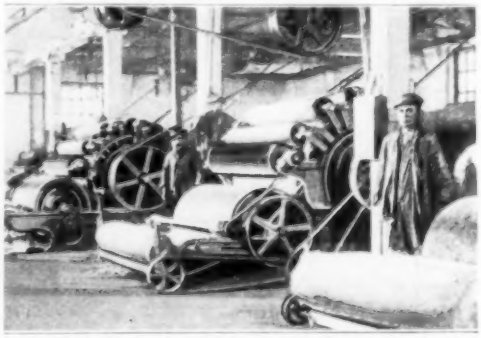
notice. A small-bore reciprocating pump, driven by a gasoline engine, forces oil at high pressure to two five-cylinder rotary motors that are incorporated in the driving wheels. There are no external gears, sprockets, or chains, and therefore little power is lost in transmission. The machine weighs 6,000 lb., and is said to have developed in tests a drawbar pull of equal amount. Two-thirds of the weight is centered in the wheels as a live load. It has a good range of forward and reverse speeds and is built to handle a four-bottom plow. Because the driving wheels are independently controlled, the tractor can turn in a small area.

OUTGOING TROOPSHIP SUNK AT SEA BY HUNS

With 2,179 United States troops aboard, the steamship "Tuscania," under convoy of British warships, was torpedoed and sunk by a German submarine north of Ireland on February 6. The ill-fated vessel carried the following units: Headquarters' detachment and companies D, E, F, 20th engineers; 107th engineer train; 107th military police; 107th supply train; 100th, 158th, and 213th aero squadrons; replacement detachments 1 and 2, 32nd division, and 51 casual officers. At the time of writing the bodies of 159 American boys had been recovered and 145 of them buried along the Scotch coast.

WAR INCREASES DEMAND FOR SHODDY

The process of reclaiming wool from all sorts of rags has become a task of increasing magnitude since the placing of the government's big orders for army clothing, special machinery being employed to reduce the rags to shreds, wash them, separate the wool from the cotton, etc. Cloth experts claim that this reworked wool, or shoddy, is suitable for use in overcoats, because a warmer, more closely woven fabric can be produced, if used in the right proportion with virgin wool. For this reason it is used in army overcoating, but all other uniform cloth is of pure wool, according to government officials.



Big Machines Employed in Reclaiming Wool from Rags, a Process Which Includes Shredding the Cloth, Washing It Repeatedly, and Separating the Wool from the Cotton

COMMENT AND REVIEW

THE American people responded splendidly to the call last year to increase production of foods by widespread individual effort. Owners of magnificent estates who formerly raised a great tumult if a single dandelion dared to raise its head on the lawn, heroically plowed their front yards, and potatoes, beans, and onions appeared where the velvet green had reigned supreme. Others, with only a few square feet of opportunity and only a few hours a week to spare, also dug and planted and watered. The aggregate results were really worth while, even though in many cases there was a crop failure. The physical benefit and the feeling of patriotic endeavor was, however, well worth the work.

Get Gardens Going

And now, as another planting time is at hand, the effort should be repeated and largely increased. To those whose crop was disappointing, there is this word of encouragement: Many soils were what the farmers call "sour," a condition often cured by simply turning it over so sun and air and rain can do their work. Some soils needed only a little fertilizing and some consisted of a few inches of black dirt covering sand, bricks, and other rubbish left from building. But even the poorest soils will be more responsive this second year of planting, and in any event the yards and gardens which will yield a profitable return will total thousands of acres, and every pound which can be raised at home will add just that much to the canning factories to be put in shape for shipment abroad. Tomatoes, carrots, beans, beets, are all easy to raise, and the humble cabbage is not to be despised, for it is one of the most nutritious vegetables; early in the war the Russian army had little else than cabbage for a long time, and fought hard.

Let all who can, join in the work; even the cliff dwellers in apartments can help their friends who have yards. A well-kept garden—always a luxury—should be a mark of distinction in these days.

SCARCELY had the great fleet of German passenger liners made fast to American docks before their engine crews, in accordance with long-prepared plans, set feverishly at work to render these ships incapable of use. Bearings were filled with powdered emery and other active abrasives; nuts, bolts, and delicate parts of intricate and very exact construction were removed, and either dropped overboard or hopelessly mixed. Steering gear was tampered with; electric wires were crossed in inaccessible places and grounded where the current would cause fires; boilers were weakened to explode under the slightest overpressure; explosives fashioned and colored to resemble small pieces of coal were scattered through the fuel.

Hats Off! Surprise On

Damage of every nature was done to concealed parts which were expected to pass unnoticed and then break after a few hours' or days' operation. All that skill and acquaintance with their own construction and ingenious study could suggest was done to defeat and baffle any attempt to navigate the ship.

And when even German thoroughness had reached its limit, the captain of the largest vessel in the fleet proudly surveyed the work and confidently and defiantly announced he would "take off his cap to the American who could repair one of these ships to an operating condition."

Since the previous issue of this magazine was written there sailed one morning out of the mist into a French port, a modern armada of 16 great liners—powerful, fleet, commodious; the largest one built to transport ten thousand German soldiers. And this armada, unheralded, had the unmistakable form of German ships, but the battle-gray hulls bore such good American names as "Mt. Vernon" and "Huron" and "President Lincoln" and each flew a bright new flag of stars and stripes. The Leviathan of them all had on board eight thousand soldiers, but they were not German soldiers: instead they were lithe of body, active in limb, keen and eager of face, and they wore uniforms of khaki. The other fifteen ships were loaded to the guards with thousands more of the khaki-clad. And the multitude of French who flocked to the wharves to welcome these brothers-

in-arms from over the sea, sent up a glad shout of welcome and took fresh heart at the coming of the Sammies.

If that German captain has the slightest regard for his word, it is incumbent on him to walk with humility and head unbared for the remainder of his life.

THERE is a steadily increasing impatience throughout the country at the lack of severity on the part of our Government toward those who are here as spies or traitors and who are scheming and working in every way, chiefly underhand, to harm our soldiers and our country. Almost every day we read of incendiary fires, costing in dollars from a few hundred thousand to a million or more. Yesterday it was a shipyard, today it's a warehouse filled with food supplies; tomorrow it will be an ammunition works; and the enemy in our midst and at Berlin laughs in devilish glee and the sound of his mirth is like that of Nero. Some are caught with incriminating documents; others in the act of sedition and conspiracy.

Guillotines in Public Places

A public execution by the guillotine is a revolting, repulsive sight, but if nothing else will serve to stop the work of the treacherous thousands with which this country is honeycombed, we might better set up the gleaming blade in our public places, and, having set it up, put it to use. While our young men are heroically offering to make, and already daily are making, the supreme sacrifice, we permit the work of spies whose whole effort is to bring disaster and death to our men.

The German is in deadly fear of the bayonet thrust in battle; of the dignified, solemn, irresistible guillotine he would have even greater horror. Perhaps a few public examples might be sufficient; it would at least greatly reduce the number of those most openly offensive. The very sight of a ghastly guillotine, by day and night, would impress its latent possibilities upon even the most hardened Hun. Nor will there be those wanting to pull the cord when once the proof of guilt has been established. But desperate diseases require unusual treatment, and the firing squad or even the hangman's knot are too good for some people who will walk our streets today and smile at our credulity while they sneer at our nerve.

THERE are yet those who, obsessed by the tortures of mind and body, and shrinking from the conflict, are willing to accept any kind of peace if it will bring only a temporary mitigation of distress. Such a feeling is the same as leads one to turn back at the dentist's door, or postpone a necessary operation, which alone will cure. It should be noted that not France, Belgium, or England, which have suffered the most—and this includes their colonies—see any hope in any settlement made before a complete defeat of German arms. The peace-at-any-price thinkers seem to lose sight entirely of the fact that Germany has consistently and continuously demonstrated that her word is only a matter of convenience, to be annulled and forgotten whenever advantage makes it desirable. For that reason we cannot make a peace with Germany conditioned only on promises, for her promises are "scraps of paper." The attitude of the German people is "like father like son," and not until the people of Germany realize defeat can we expect a condition on which a lasting peace can be built. Saturated with pride and self-confidence, taught to believe they are a superior race of beings and destined to inherit the earth and rule it, there remains only one thing which will open their eyes and reveal to them the picture of scientific savages which they are. Starvation will not accomplish it, for Germany will not be subdued by starvation any more than the U-boats have starved England.

Peace with Unrest

They will be subdued by only the same means with which they planned—and have executed as far as possible—to conquer Belgium, France, and England. And that is, decimation. Cold-blooded, ruthless slaughter of men, by every method available to kill, that was and is the hope of German victory—and with such a people, to whom the adjustment of differences knows only one settlement and that entirely favorable to them, it is impossible to negotiate. Diplomacy is about as serviceable as a bent-pin fishhook to catch whales. The pronouncement of our President of our own aims and position in the war is an indispen-

sable basis for future settlement, and read and discussed by the people of Germany, it will be the seed. But the machines for cultivating and harvesting must be mortars and aeroplanes, the barrage, the advance, the bayonet thrust. It is a sickening, disheartening conclusion to arrive at, but those best experienced and informed, including hosts who once held pacifist ideas in holy veneration, now declare there is no other way.

Then let us enter into the spirit of sacrifice with renewed vigor and determination. Instead of a thoughtless, joking disparagement of this and that food regulation, let it be a joy that we are permitted to do even this little mite. Let our determination to fight to the limit of men and resources, be not like the religion of those who believing in God and the church take good pains to live so no one will suspect them of it—but the fervent, boiling, white-heat, volcanic type of patriotism, resistless as a cyclone, enduring as the mountains; all-pervading as the air we breathe.

Do you remember the "Maine"? The present is a situation which demands the patriotism of a thousand "Maines" blowing up at the same instant. Let the Paul Revere of your intellect carry a midnight message arousing to arms every fiber of your being. Wake up! If you can't wear fighting clothes, at least put on the fighting spirit.

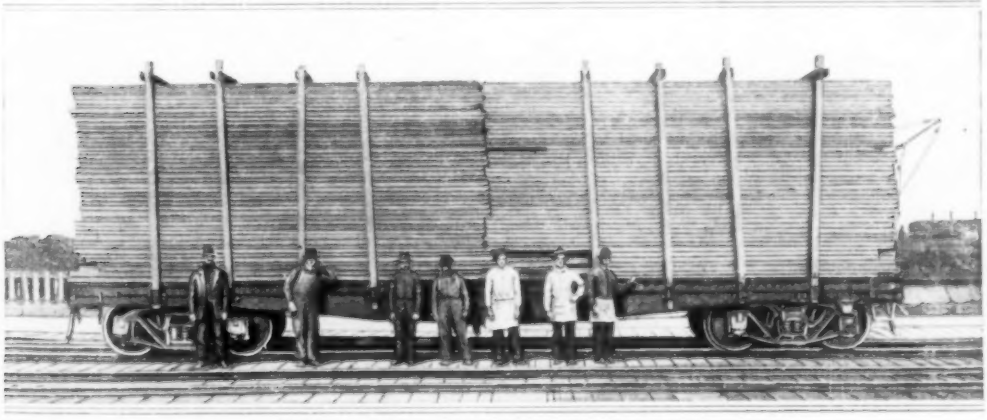
Our Sunken Transport

IN the sinking of the "Tuscania," the uncertainties of war are brought home to us all; and with unmeasurable sadness to the families and friends of those brave boys who went down without ever having fired a shot in battle. The waves breaking on our shores sound the dirge which reaches from Atlantic to Pacific. A few score mothers put on black, a few wives gaze into the starry heavens which to them are utter darkness; a few sweethearts crushed, feel that all hope and joy in life has forever gone.

Each day now adds to the number of those who pass from the group of gay and happy to join those who mourn. So widespread has been bereavement in France that not a woman in all that country dresses in bright colors unless forced by destitution to do so. Black everywhere is the sign of national mourning. We, too, will have our share of broken hearts, but that the number may be as small as possible let us employ every agency, every energy to fight as those who died would have us fight.

H. H. WINDSOR

February 16, 1918.



HUGE LOAD OF LUMBER ON FLAT CAR

WITH many calls for every available freight car and with lumber in greater demand than ever before, maximum lumber loads on freight carriers have become a necessity. A striking instance of this wartime speeding up is the huge lumber load shown herewith, photographed in Oakland, California. Its net weight is **108,500** lb., which is very exceptional for a car of this size.

PRISM-SHAPED PHONOGRAPH HAS MOTOR BELOW HORN

A phonograph which represents a new departure in talking-machine construction has a three-sided case, making it prism-shaped, while the turntable and motor are situated beneath instead of above the concealed horn. The latter is connected with the sound reproducer by a tone arm that stands almost vertically. The phonograph can be operated by a person while seated.

New Style of Phonograph, the Motor of Which can be Wound or the Records Changed While One is Seated

NEW WAR COURSES AT YALE TO RIVAL WEST POINT'S

The authorities of Yale University have announced important changes in the school's courses designed to turn out expert artillerymen. Beginning next fall there will be offered a three years' course in training for war, which in some respects will rival that of West Point. In the university at the present time, it is said, there are over 700 men enrolled as members of the officers' training corps, and it has been to meet their demands for additional intensified instruction that the new branches of study are offered. By establishing these courses it is believed that the school will be brought more closely in touch with the present needs and will be able to utilize current interest in military affairs as a motive in producing effective work in the classroom.

GETTING MAIL A HARDSHIP FOR MOUNTED POLICE

One of the hardships of the mounted police in the far Northwest is occasioned by the infrequency of the mails, some of the men receiving letters only three or four times a year. In the winter, going to the post office involves many days of travel with dog teams over wind-swept prairies, with little shelter for the night but the snow.

Members of the Mounted Police Force in the Far Northwest and Their Dog Teams, Making a Six-Days' Journey over the Bitter-Cold Prairies to Get Several Months' Mail

Cars with Floors Five Feet above the Pavement Carried Passengers through Cincinnati's Flooded Streets. The Dual Trolley Poles do Not Represent Special Equipment. Double Overhead Conductors are Regularly Used in the City

CARS ON "WADING TRUCKS" FOR FLOODED STREETS

High-water street cars were successfully operated in the flooded sections of Cincinnati where the depth of the water made ordinary equipment useless a few weeks ago. Open-side summer cars were carried on the platforms of special trucks that lifted the floors five feet above the pavement. The motors were mounted high and dry, and their power was transmitted to the wheels by driving chains.

CONCRETE ARMOR PROPOSED FOR WARSHIPS

An Italian naval engineer has proposed the use of reinforced concrete instead of steel as an armor plate for warships. His plan involves equipping a vessel with three coats of concrete, the outer one being the richest in cement and hardened by chemical treatment. The materials suggested are Portland cement, sand, and basalt or porphyry, broken to pass through a coarse screen.

CURVED KNITTING NEEDLES FOR MAKING SWEATERS

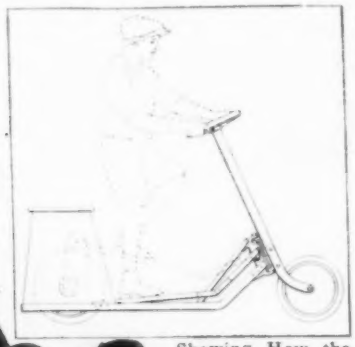
Curved knitting needles are now being manufactured for the convenience of persons making sweaters, or other large articles. Each needle is about 20 inches long, half of it being straight and the remainder bent into a graceful coil. This length affords enough space so that the work need not be crowded. It is said that these needles are as easily operated as straight ones and are less apt to be hit by passers-by.

¶ Norwegians are testing the grinding of dried fish for shipment in paper cartons, tin containers being scarce.

SWIFT "FOOTMOBILE" MADE FOR ENERGETIC CHILDREN

Splendid speed without violent exertion is afforded by the latest of juvenile vehicles—a low-built "footmobile" supplied with a novel transmission system. Two pedal boards pivoted at their front ends are attached at the rear to stanch straps. Each of these passes around a pulley, mounted in the upper part of the seat housing, and is anchored to a divided ratchet hub fixed to the rear axle. By throwing his weight first on one and then on the other of the pedal boards, a child propels the device forward. The strap and ratchet-hub arrangement is similar in principle to a window shade and its roller. A downward thrust of a pedal board causes the strap to unwind. Release of the pressure causes a spring to rewind the hub. A child stands erect, supported by the steering column, and manipulates the boards by marking time. Without overworking he can outrace a fleet-footed companion. The pedals may be locked against motion so as to permit coasting.

The Three-Wheel Type is Particularly Suited for Young Children, and a Passenger may be Carried if Desired



Showing How the Straps Carry Power from the Pedal Boards to the Divided Ratchet Hub on the Rear Axle

With the Two-Wheel "Footmobile" a Strong Boy can Outrace an Equally Strong Companion Who Depends upon His Legs for Locomotion

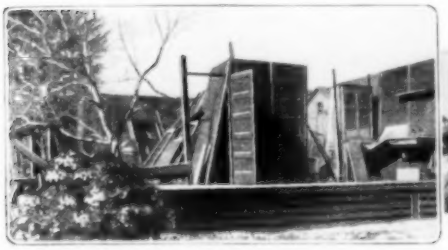
BRITISH WAR-TIME SHOES BRING DOWN PRICES

Samples of shoes of several grades for men, women, and children which are to be sold in the British Isles at a rate of profit regulated by the government were recently placed on exhibition in England. They attracted a great deal of attention because of the lowness of the prices and the excellent quality of the goods, solid leather being used.

PASADENA TORNADO CALLED "VILLAGE CUT-UP"

To those who insist that strong winds are unknown in certain parts of southern California, a "homemade" tornado that cut capricious capers at Pasadena some weeks ago was as surprising as it was unwelcome. It was acknowledged to be a "home product" because it formed at one side of the city, hopped, skipped, and jumped to the other side, and then dispersed. The first object of its vengeance was a large stone church, one gable of which was badly damaged. After that the "twister" blazed a path about 200 ft. wide for a mile and a half, peeling off the shingles of one house, removing the roof of another, ignoring the next, de-

The Garage Above and the Dwelling Below, Both Practically Demolished, Are Examples of the Storm's Capriciousness, for Near By Are Buildings That Sustained No Injury Whatever



Selecting the Church for Its First Real Blow, the "Twister" Blazed a Straight Path across Pasadena, Peeling Off Shingles, Removing Roofs, Missing Some Houses Entirely and Wrecking Others Completely

molishing the fourth, shaking the rafters of the fifth, and so on. Many who witnessed such a visitor for the first time were bewildered to behold a whirling, roaring cloud a few blocks away make kindling wood of substantial houses while the leaves on trees a few hundred feet out of its path hung motionless in a perfect calm.

ARMY TRANSPORT REPAIRED IN RECORD TIME

What is pronounced the quickest repair job ever done in the shops at the Panama Canal was completed the 20th of last January, the vessel, a merchant ship of nearly 20,000 gross tons, used in transport service, having gone into dry dock on the 30th of the previous month. Included in the items of repair were a new stem 60 ft. long, 14 in. deep, and 4 in. thick, and a new hawse pipe of seven and one-half tons. The latter involved cutting away all of the material around the pipe, including 40 tons of concrete that had been used in temporary repair work. The force included 450 skilled mechanics and 1,000 helpers.

BIG BRIDGE TO WAR PLANT CONSTRUCTED QUICKLY

Extending from Neponset, a few miles south of Boston, to Squantum, is a long bridge, the construction of which in a few weeks' time is pronounced one of the striking achievements of our manifold war activities. The structure shortens by several miles the route to a new plant where destroyers are being made, and is appropriately named "Victory Bridge."

"Victory Bridge" Leading to a War Plant a Few Miles South of Boston: Its Rapid Construction is Regarded as an Unusual Achievement

CAR OF BURNING COTTON HURRIED TO FIREMEN

Instead of firemen hurrying to the scene of a blaze, a fire was carried to the firemen recently when a train crew in southern California found a valuable carload of cotton in flames. The train was nearing Pomona at the time and was instantly speeded up so as to come alongside the fire station near the tracks in that city. A good share of the cotton was saved by the quick action of the crew and fire company.

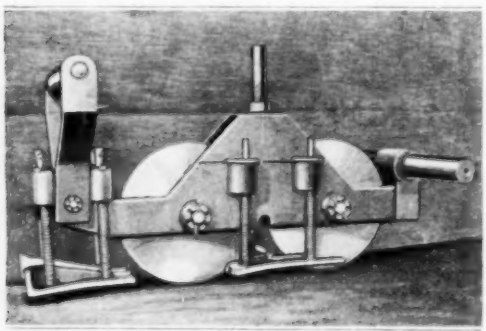
Carload of Partly Burned Cotton near the Fire Station at Pomona, California, Where It was Brought by Rail When a Train Crew Discovered It Was Ablaze

BUILD NEW PATROL VESSELS FOR NAVY AT HIGH SPEED

Announcement by Secretary Daniels that the keel of the first of the new Ford patrol boats for the navy was laid on February 7, just 20 days after the contract had been executed, recalls Secretary Baker's dramatic statement regarding the speed attending the designing and building of the first Liberty motor. It was on December 22 that Henry Ford offered by letter to utilize his Detroit plant for the construction of small naval vessels. Between that date and January 17, the new type of boat was designed and all negotiations for its construction in large numbers completed. The craft is said to possess many of the advantages of destroyers and to be as large as those of the old type. At the rate the work is being pushed, all previous records for the fabrication of steel naval vessels are expected to be far surpassed.

FAST SHIP-CALKING DEVICE DOES TEN MEN'S WORK

Speed being one of the essential elements in the present wooden shipbuilding program, it is of interest to know that a calking machine, designed to accomplish the work of 10 men, has been developed. The apparatus is provided with two tandem rotary disks that tamp the tarred oakum into the seams as it is guided along between the planks. Under ordinary conditions, as demonstrated by recent tests, the device calks more than 5,000 ft. of seam in a normal working day. It is operated by compressed air. The gauge of the disks used depends upon the width of the cracks to be filled.



This Machine, Built to Replace the Conventional Iron, is Said to Calk a Mile of Seam a Day

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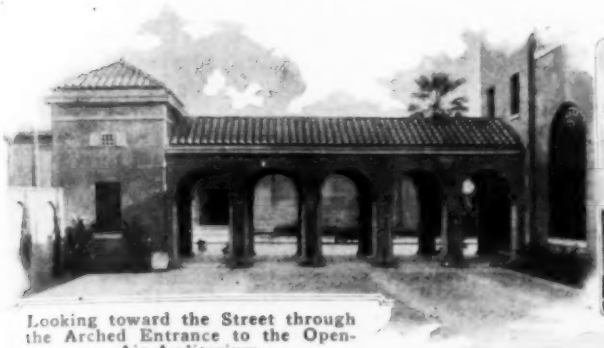
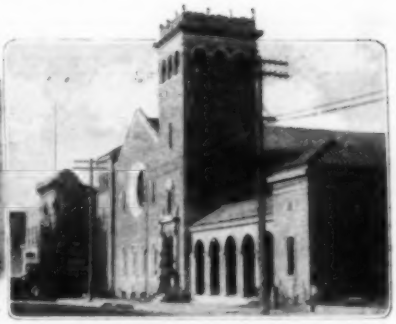
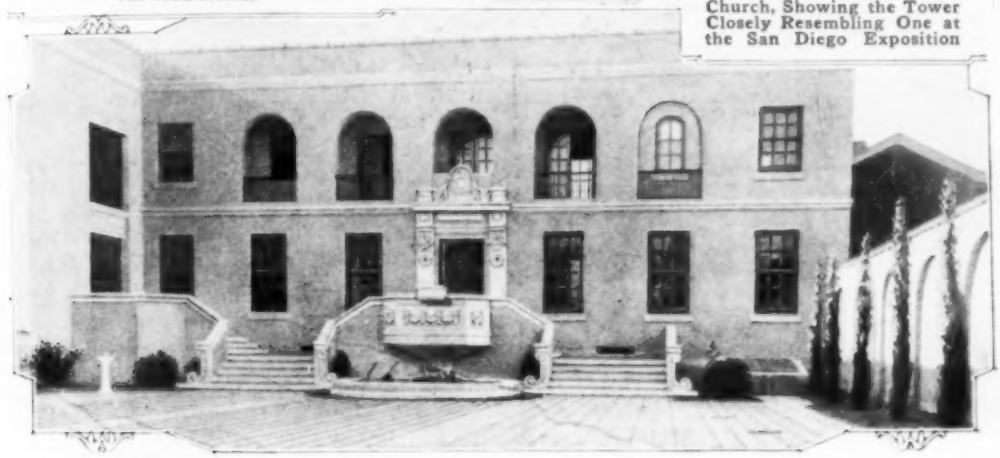
¶The Federal civil service commission has announced that women who can qualify will be employed as ship draftsmen in the Navy Department at Washington, and in the various navy yards.



Looking toward the Street through the Arched Entrance to the Open-Air Auditorium



View of the Front of the Church, Showing the Tower Closely Resembling One at the San Diego Exposition



The Outdoor Pulpit is Flanked by Broad Flights of Steps and Fronted by a Shallow Pool

NEW CHURCH HAS OUTDOOR AUDITORIUM

An outdoor auditorium, in which seats can be placed for several hundred persons, is a striking feature of a new church in Santa Barbara, Calif., which the mild climate of the region will make usable much of the year. This assembling place, suitable for services or for social functions, is in the form of a paved courtway, which is entered from the street through an arched portico and is inclosed on the three remaining sides by the adjoining church and a high wall. At the end farthest from the street, against the side of the edifice, is a handsome concrete pulpit, approached on either side by a broad flight of steps and fronted by a shallow pool. Near by is a bubbling drinking fountain. The chief architectural characteristics of the church are its round arches, red-tile roof, and its square tower, closely resembling one at the San Diego Exposition in its proportions and ornamentations.

NURSERY SCALES ATTRACT TRADE TO DRUG STORE

A druggist on the alert for novel means of attracting people to his store hit upon the idea of putting in a nursery scale on which any baby could be weighed gratis. The innovation soon became popular, proving to be a decided convenience to many mothers, and increasing trade.

HURRIEDLY ERECTED CHUTE FOR CONCRETE BREAKS

Weaknesses, which may have been present because of hasty assembling, caused a concrete conveyor employed

A Concrete Conveyor Employed in Construction Work at a Government Plant Which Gave Way, Killing One Man and Injuring Six

in construction work at a new government plant to give way. The falling materials killed one man and injured six. It was supposed that every needed precaution had been taken in erecting the structure.

SOAP-FILM ANALOGY SOLVES KNOTTY TORSION PROBLEMS

It is surprising to learn that the study of soap films is of scientific value in mechanical engineering. This has been demonstrated at a British aeroplane factory where difficult torsion problems have been solved by an unusual method. Soap films are used in determining the stresses and torsional stiffness of twisted bars and shafting. Particular importance lies in the fact that the method is successfully employed irrespective of the cross section of the member under scrutiny. It appears that the equations expressing the torsion of any elastic bar correspond exactly with those representing the displacement of a soap film when covering an aperture of the same cross section in a flat plate and subjected to a slight pressure. Accuracy is vitally necessary in aeronautical calculations, and a simple method of determining stresses, when complicated sections are involved, is of considerable moment.

COAL BOAT FROZEN FAST NEAR LONG ISLAND

Frozen fast in the ice, the schooner shown in the accompanying illustration might be taken for the craft of an arctic explorer in the far north. However, the photograph was taken in Long Island Sound where 12 in. of ice formed during the intense cold of January and held the vessel motionless for eight days. A special reason for attempting the journey at a time

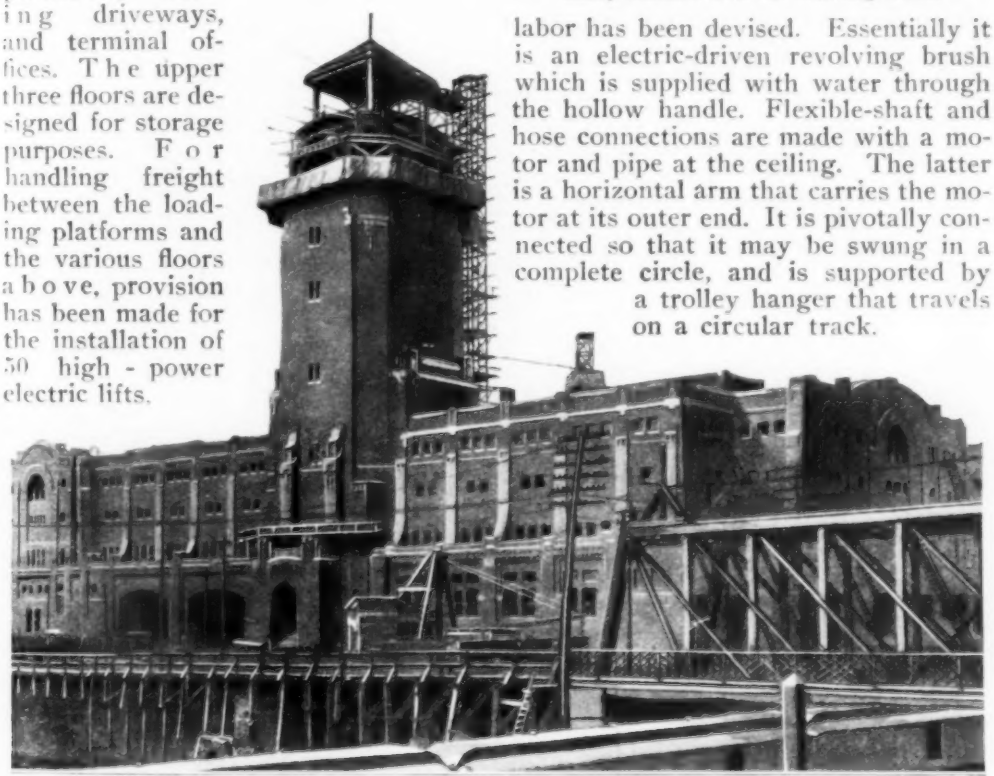
A Scene Suggestive of Arctic Exploration: A Schooner, Laden with Coal, Frozen Fast in Long Island Sound

of unusual hazards was the fact that the boat carried sorely needed coal.

¶Because of the scarcity of steel, whalebone is again being used for umbrella ribs and corset stays, causing the price of the latter to increase about 33 per cent.

CHICAGO FREIGHT TERMINAL HAS GREAT CAPACITY

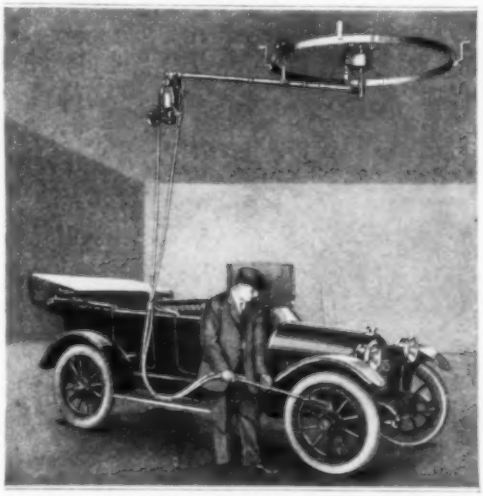
One of the largest and most efficiently arranged freight terminals in America is the $4,000,000 structure that is nearing completion at Chicago. It is five stories in height, 420 by 750 ft. in ground dimensions, and surmounted by a centrally located tower of eight stories, which rises 130 ft. above the main roof. In addition to contributing much to the architectural effect, the tower supports between its fourth and sixth floors a 50,000-gal. fire-service tank, above that the 16-ft. dials of a four-faced clock, and provides, on its first three floors, abundant record-filing space. Nineteen tracks and the loading platforms are depressed below the street level and occupy the first floor of the building. The second floor, which is even with the street, accommodates the trucking platforms, teaming driveways, and terminal offices. The upper three floors are designed for storage purposes. For handling freight between the loading platforms and the various floors above, provision has been made for the installation of 50 high-power electric lifts.



Loading Platforms and 19 Depressed Tracks Occupy the First Floor of Chicago's Great New Freight Terminal, Which Is Approaching Completion

REVOLVING FOUNTAIN BRUSH AUTOMOBILE WASHER

For garages, public and private, a motor-car washer that saves time and labor has been devised. Essentially it is an electric-driven revolving brush which is supplied with water through the hollow handle. Flexible-shaft and hose connections are made with a motor and pipe at the ceiling. The latter is a horizontal arm that carries the motor at its outer end. It is pivotally connected so that it may be swung in a complete circle, and is supported by a trolley hanger that travels on a circular track.



The Running Gear and Under Parts of a Car are Easily Reached with the Whirling Brush

ICE JAM AND WINTER FLOOD DO LITTLE DAMAGE

If there is such a thing as a flood being good-natured while rampaging, a Connecticut River mid-winter torrent deserves that description. Thousands of acres of lowland were submerged. When the water subsided fields of ice packed the banks on opposite sides of the stream. Miles of highway were covered and telephone poles deeply buried. It was difficult to chop through several feet of almost solid ice, but when this was accomplished, roads were found in good condition. Although ice cakes in many places were piled to the cross arms, telephone poles were not brought down and service was maintained without interruption.

Telephone Line and Road Intact in Spite of "Avalanche" of Ice

FEZ-SHAPED MILITARY CAP FOR MILD OR COLD DAYS

A convertible fez-shaped cap has been designed to meet the needs of our soldiers overseas in either mild or cold weather. It is provided with lined flaps of generous proportions that ordinarily are worn folded about the crown, helping it to keep its shape. When it is cold, these can be brought down about the ears and chin, and tied in front.

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Two Ways of Wearing the New Fezlike Military Cap, Which Is as Comfortable on Blustery Winter Nights as in Moderate Weather

SMALL POLICE SUBSTATIONS IN OUTLYING ZONES

To enable the proper policing of outlying residential districts at Detroit, a dozen "stationettes" have been established in as many different localities. They are small, neat-appearing frame shelters that are connected telephonically with headquarters. Two men, who alternate with each other in patrolling the adjacent neighborhood and answering emergency calls by motorcycle, are assigned in eight-hour shifts to each of the posts.

Two Men and a Motorcycle are Assigned to Each of the 12 Police "Stationettes"

HAPPY AND SOLEMN SIDES OF AMERICA'S WORK

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Nobody's Lonesome Here! Yankee Troopers, after a Turn in the Trenches, being Shown the Way to the "Y" in Paris by Their Smiling Young Hostesses

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Old Glory has been Adopted as a Regimental Flag by These Russian Soldiers in France Who have Remained Loyal to the Allies

A Placard Bears the French Inscription, "Here Rest the First Soldiers of the United States Fallen on French Soil for Justice and Liberty"

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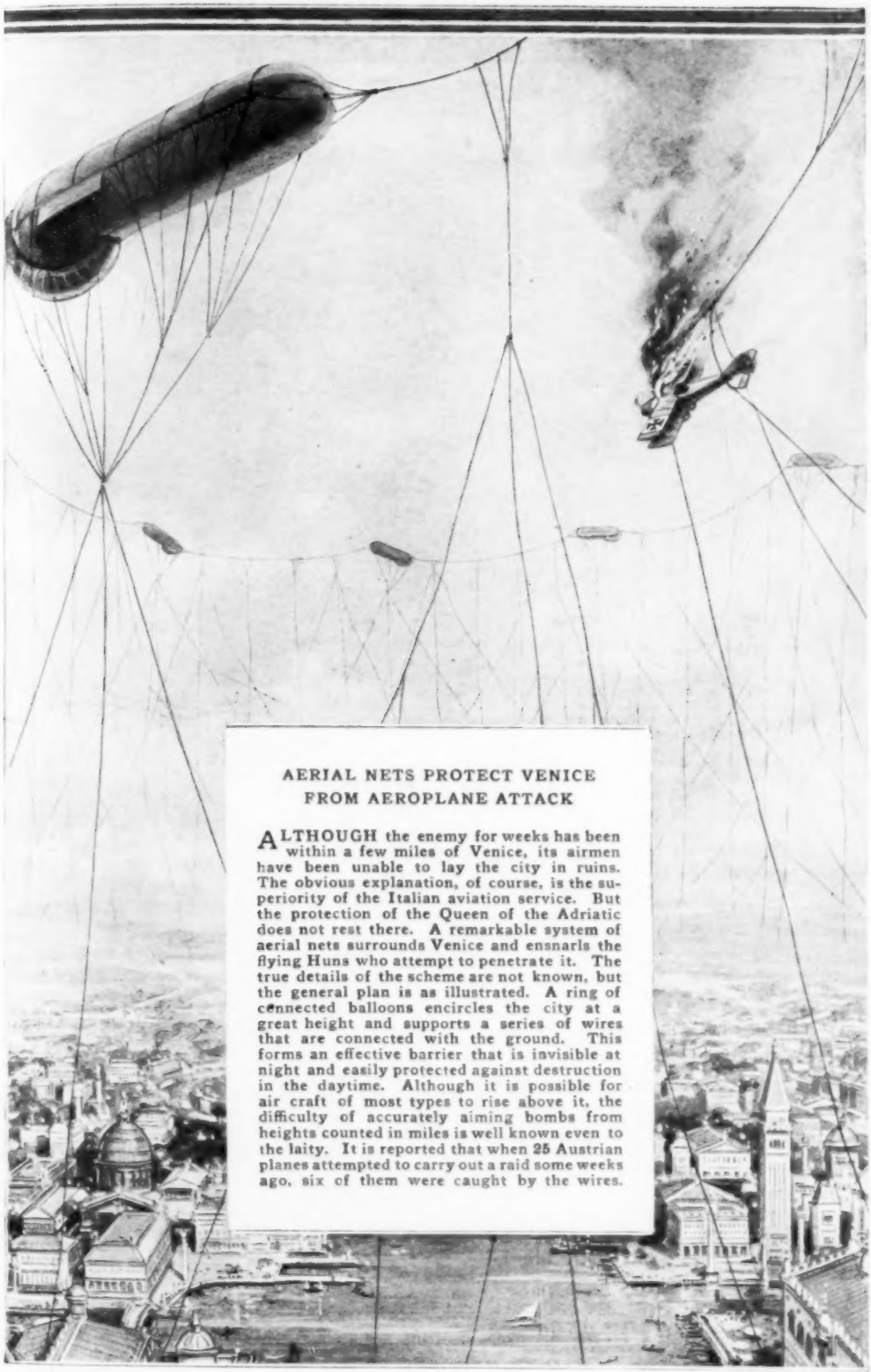
MANY TURKS ARE TAKEN BY BRITISH IN MESOPOTAMIA CAMPAIGN

ON the way to a place of safe-keeping, hundreds of footsore Turkish captives being escorted by British soldiers: The sullen procession is passing through the ancient city of Bagdad by way of "New Street" and "Piccadilly Circus," as Tommy Atkins has seen fit to call the route that leads between the walls of buildings centuries old. Bagdad now has a population of about 180,000. At the height of its prosperity, in medieval times, it harbored more than 1,500,000 persons within its walls.



AERIAL NETS PROTECT VENICE FROM AEROPLANE ATTACK

ALTHOUGH the enemy for weeks has been within a few miles of Venice, its airmen have been unable to lay the city in ruins. The obvious explanation, of course, is the superiority of the Italian aviation service. But the protection of the Queen of the Adriatic does not rest there. A remarkable system of aerial nets surrounds Venice and ensnarls the flying Huns who attempt to penetrate it. The true details of the scheme are not known, but the general plan is as illustrated. A ring of connected balloons encircles the city at a great height and supports a series of wires that are connected with the ground. This forms an effective barrier that is invisible at night and easily protected against destruction in the daytime. Although it is possible for air craft of most types to rise above it, the difficulty of accurately aiming bombs from heights counted in miles is well known even to the laity. It is reported that when 25 Austrian planes attempted to carry out a raid some weeks ago, six of them were caught by the wires.

TRENCH, SEA, AND STREET PHOTOS OF THE ENEMY

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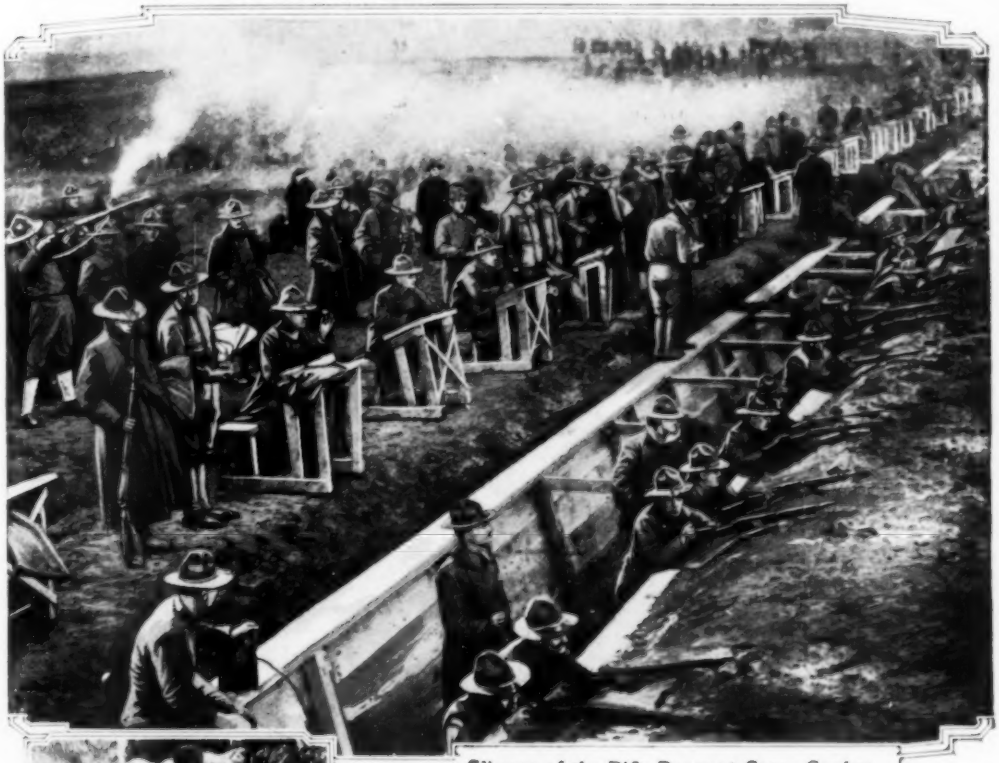
The Boche Firing over the Rims of Shell Pits through the Smoke of Allied Shells: A Dispatch Dog is Silhouetted against the Chalky Soil. The Picture was Taken from a German Captive

Landing Party from a French Vessel Reaching Prisoners and Crew of the German Raider "Seeadler," Wrecked on a Reef near the Fiji Islands: The Captain of the Raider and a Few Men had Set Forth in an Armed Motorboat to Capture a New Ship. Their Own Capture Caused the Rescue

Great Events Cast Shadows before Them. This Tank Car, Captured by the Huns and Paraded in the Streets of Berlin, Foreshadows Others Headed for Wilhelmstrasse by British and Yankee Drivers

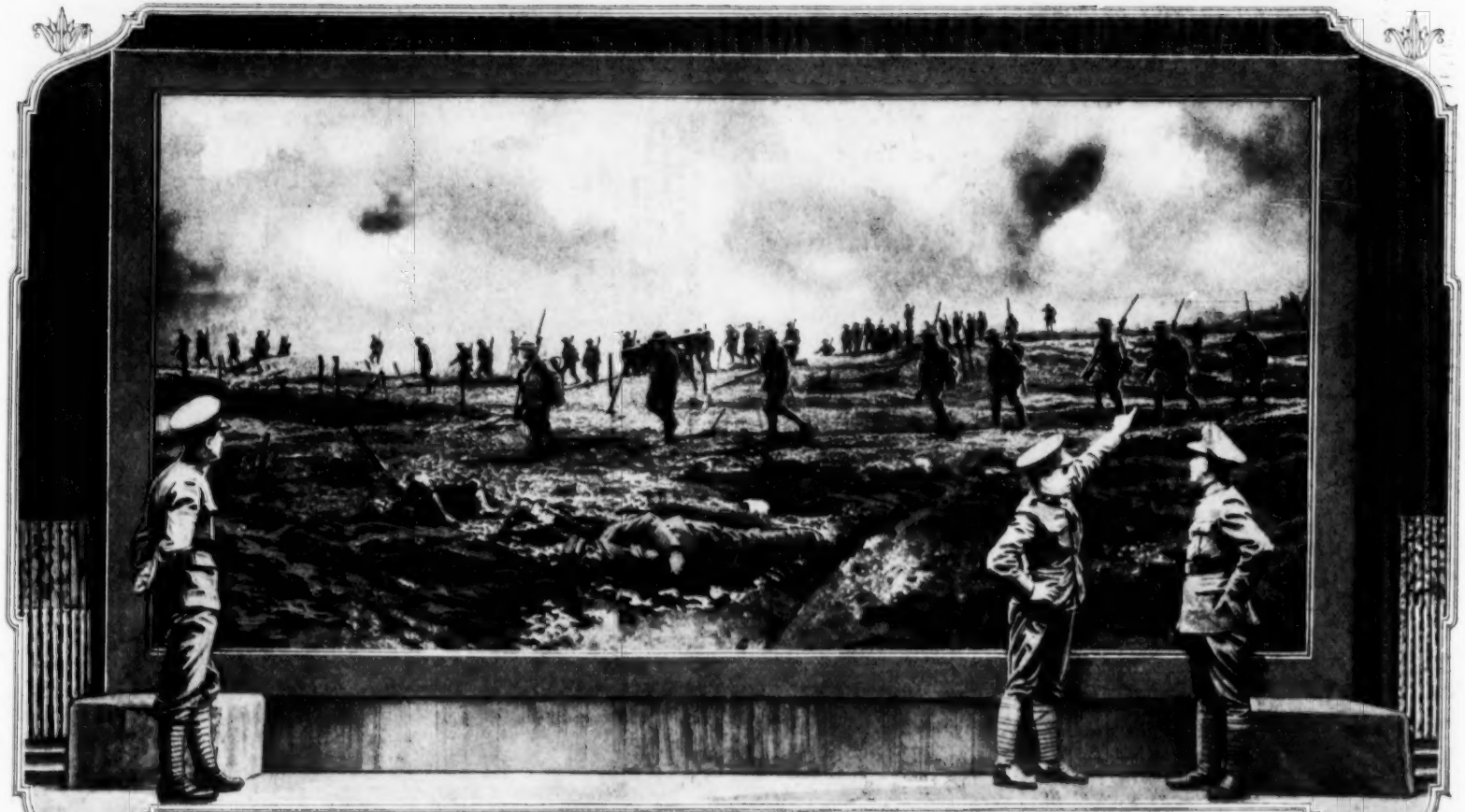
TRAINING TO BEARD THE BOCHE IN HIS LAIR



Glimpse of the Rifle Range at Camp Gordon, Atlanta, Georgia, Where Thousands of National Army Men from Georgia, Tennessee, and Alabama are Learning to Shoot below the Spikes of German Helmets

French Instructors of American Marines Passing Sandbags to Strengthen a Weakened Parapet

Student Soldiers at an American Training Camp Charging Trenches Modeled after Those of the Huns on the Western Front



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IMMENSE PHOTOGRAPH IMMORTALIZES FAMOUS ATTACK OF CANADIANS AT VIMY RIDGE

HEREWITH is a reduced reproduction of the largest war photograph in existence. The original, a 4 by 5-in. picture, was taken on April 9, 1917, when the Canadians made their memorable advance on the "impregnable" Vimy Ridge. To obtain the maximum detail and avoid retouching, a new system of enlargement was devised. Six ultraviolet lamps were placed behind the negative in a 6 by 12-ft. frame with the lenses. This was moved on rails, and the paper, negative, and lenses kept in absolutely parallel planes.

BRITISH OFFICIAL PHOTO

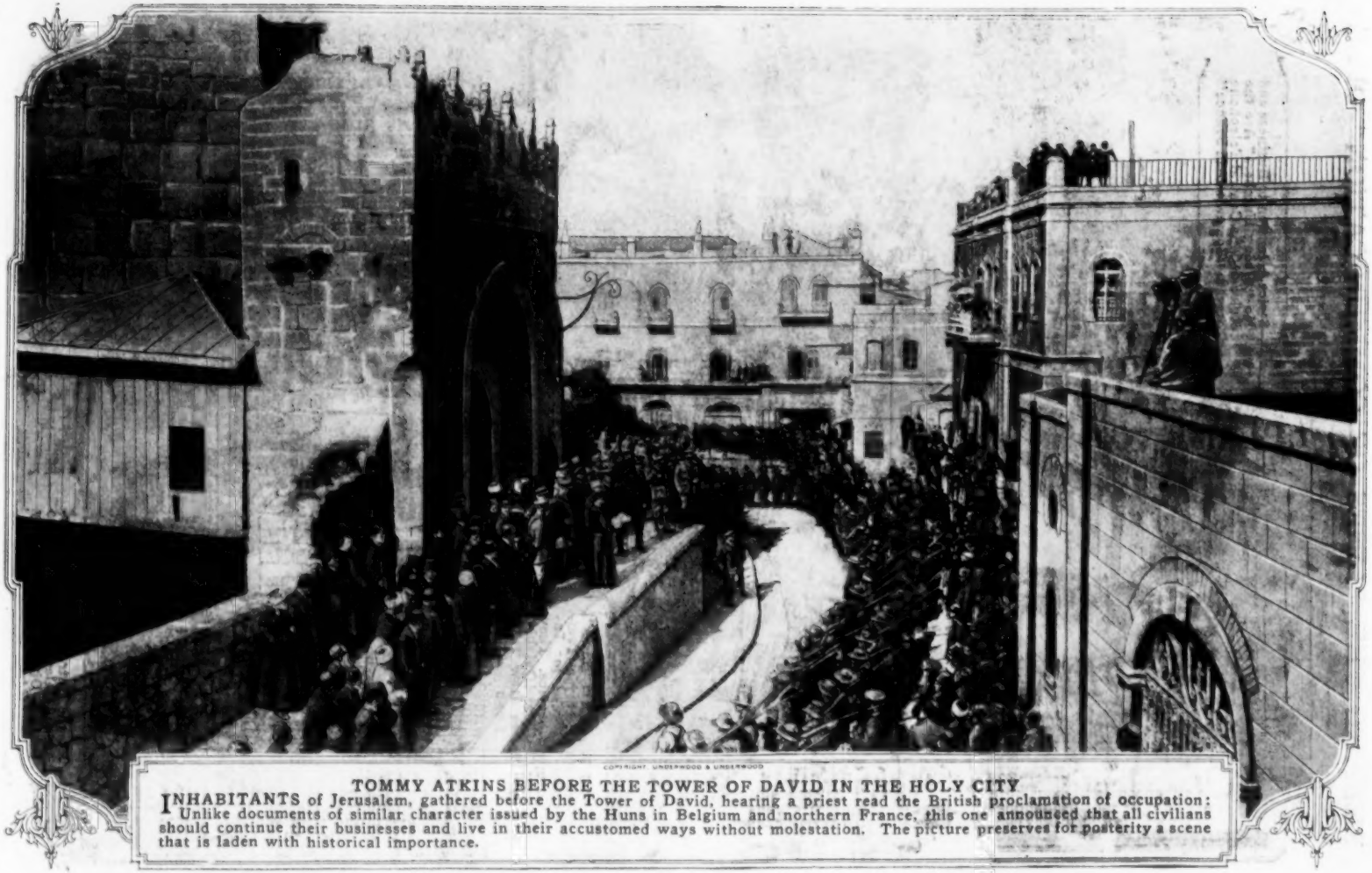
KEEPING THE "LINES OF COMMUNICATION" OPEN

Strict Attention to Business and No "Wrong Numbers" Are the Rules at This Central Telephone Station "Somewhere in France"

"All Wires Are Down" can Be Merely a Temporary Excuse for Interrupted Service. They must Go Up and Quickly. This Shows How It is Done

At the Entrance of an Underground Telephone Station in the Somme District Where Many Lines Converge

French Soldiers Stringing Telephone Wires through a Village in the Fighting Area, Where Brackets Take the Place of Poles



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TOMMY ATKINS BEFORE THE TOWER OF DAVID IN THE HOLY CITY

INHABITANTS of Jerusalem, gathered before the Tower of David, hearing a priest read the British proclamation of occupation: Unlike documents of similar character issued by the Huns in Belgium and northern France, this one announced that all civilians should continue their businesses and live in their accustomed ways without molestation. The picture preserves for posterity a scene that is laden with historical importance.

JERUSALEM DELIVERED FROM UNSPEAKABLE TURK

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Notable Personages and Heads of Religious Communities Received by General Allenby in Barrack Square after Reading of British Proclamation

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The Populace Lined the Balconies and Parapets of the Ancient Buildings When the Deliverers of Jerusalem Passed through Jaffa Gate Afoot. The Commanders of the French and Italian Detachments Walked at Opposite Sides of General Allenby

FROM CAMEL TO AEROPLANE IN THE BALLY

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As Far as the Eyes can See, Camels Laden with Ammunition and Supplies Wending Their Way through the Foothills of Judea

French Coupé with Accommodation at Rear for a Wounded Soldier: The Machine Is in the Service of the Hospital Corps and is Used for Cases That Require Special Handling

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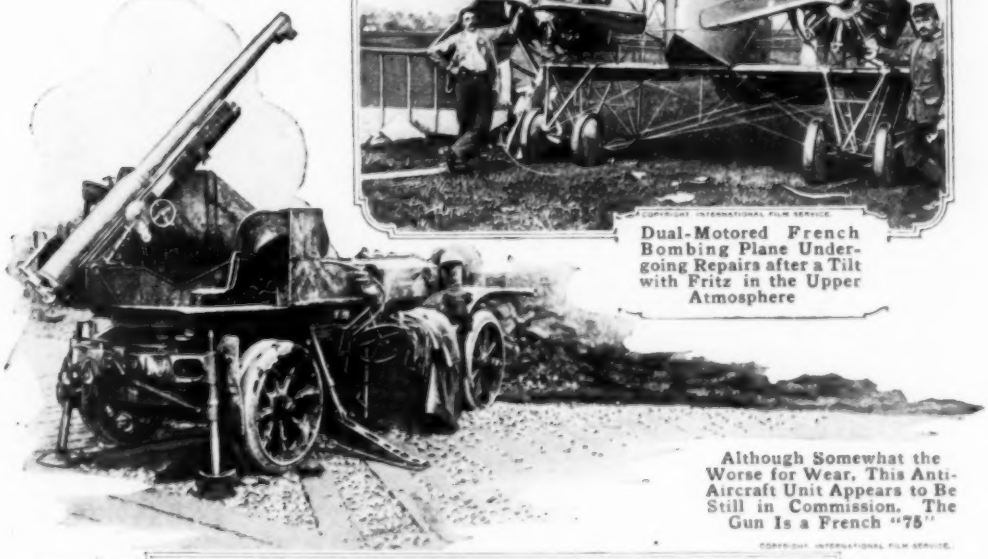
German Prisoners during the Battle near Cambrai Removing Wounded Men from a British Underground Dressing Station

CANADIAN OFFICIAL PHOTO. COPYRIGHT

A Real "Tug o' War": Canadian Soldiers Loading a 15-Inch Howitzer That Is in Constant Communication with the Enemy's Tender Spots

BUSINESS OF STRAFING THE BLOODY HUN

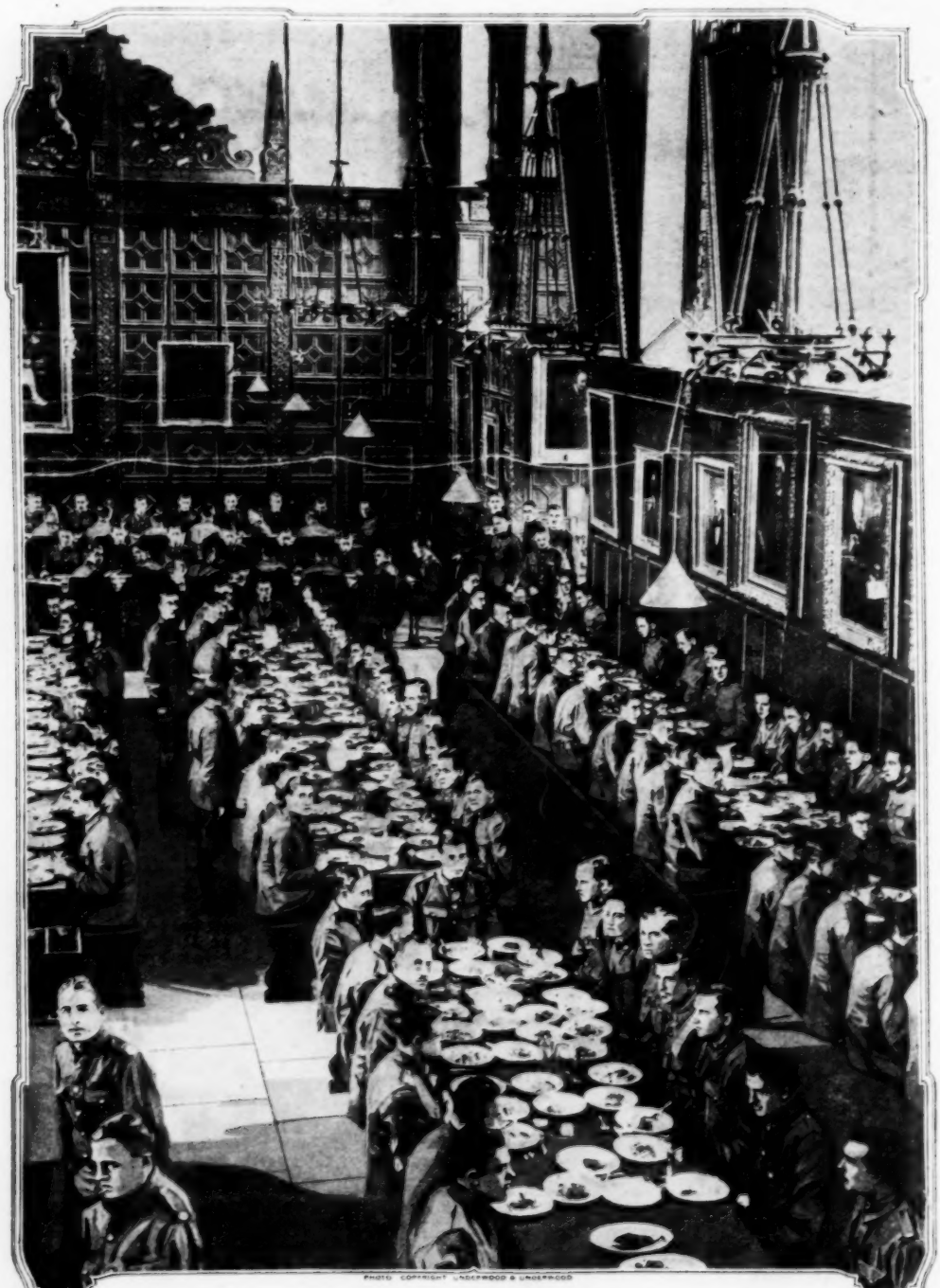
Dual-Motored French Bombing Plane Undergoing Repairs after a Tilt with Fritz in the Upper Atmosphere



Although Somewhat the Worse for Wear, This Anti-Aircraft Unit Appears to Be Still in Commission. The Gun Is a French "75"

At the Outset of a "Business Trip": A Tricolor Aeroplane of the Type Shown under Repair Above, Leaving Its Hangar and Taking to the Air

FAMOUS TRINITY HALL USED FOR CADETS' MESS



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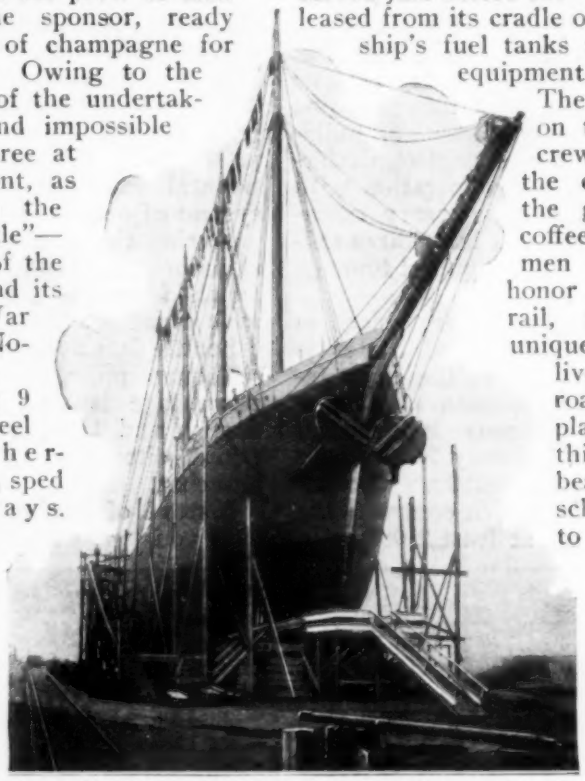
CADETS of the Royal Flying Corps are here shown at mess in magnificent Trinity Hall at Cambridge University. The grounds of the great institution are being used in drilling student airmen and many of the buildings are employed exclusively for war purposes. Cambridge is only one of the British universities that has turned over its facilities to the military authorities.

SEATTLE DEMONSTRATES HER VIGOR AND RESOURCES AT TRIPLE LAUNCHING

SEATTLE, on January 19, was the scene of a unique and thrilling race. Three great shipbuilding concerns, each having completed and equipped another Leviathan for the emergency fleet, were racing like Titans for the honor of launching the first vessel on this historic occasion.

While the crowd roared enthusiastic plaudits and the bands played the "Star-Spangled Banner," the three greyhounds of the deep were lined up on the ways. At the prow of each vessel stood the sponsor, ready with the bottle of champagne for the christening. Owing to the gigantic nature of the undertaking, it was found impossible to launch all three at the same moment, as was done with the steamship "Seattle"—the first vessel of the Liberty fleet—and its consort, the "War Brigade," on November 24, last.

On signal, at 9 a. m., the steel steamship "Sutherland," 7,500 tons, sped down the ways. Meanwhile, in two nearby shipyards, two armies of workmen were busy as ants. Ropes, hawsers, blocks, tackles, machinery of steam and of electric power were used with lightning swiftness by expert hands. At the signal, 9:30 a. m., a mighty double roar resounded, for on the rival ways, ready for the leap into the waters of Elliott Bay, stood the sturdy steel steamship "West Arrow" and the trim, high-powered wooden schooner "Ypres." The "West Arrow's" carrying capacity is 8,800 tons; that of the "Ypres," 2,500. They were launched at the same moment—Seattle thunderbolts now increasing at such a rate as to hearten the nation.



The Auxiliary-Powered Wooden Schooner "Ypres," Said to be the First Ship Made in America for Overseas Service to Start Its Speed Test as Soon as Launched

Then was witnessed the rarest sight ever beheld at a launching! Starting on the race into the waters the "Ypres'" engines suddenly were "turned over" and her propeller wheels began spinning and singing a song of victory. This phenomenon was observed just before the "Ypres" was released from its cradle of timbers. The ship's fuel tanks were full. All equipment was on board. The skipper was on the bridge, the crew at quarters, the cooks busy in the galley brewing coffee. Proud workmen and guests of honor stood at the rail, to enjoy the unique ride of their lives. The crowd roared admiring plaudits. Like a thing of life and beauty, the big schooner raced into the water. Its twin screws were whirling as it took its maiden dip. Near by the big sister ship, "West Arrow," displaced a small ocean of water and proceeded on its stately way, attended by tugs. The "Ypres," proving itself a thoroughbred indeed, scorned the natal services of the waiting tugs, turned majestically, with Old Glory whipping at its masthead, and steamed out of the west waterway at full speed on its maiden voyage and speed test down Elliott Bay.

The "Ypres" is 250 ft. long, 43 ft. beam, 21.6 ft. deep, and is equipped with two 240-hp. semi-Diesel engines. It is the eighth vessel of the same type built in the same yards, all now in service, and is the fourth built especially for the French government. The "Ypres" was named in honor of the Belgian battle field where so many heroes died for freedom's cause. It cost approximately $500,000. Never before, mariners say, in the history of shipbuilding in America, has a big overseas carrier left for its trial voyage and speed tests as soon as it completed its journey down the ways.

Several more great freighters will be launched within 60 days. The Seattle yards will build this year one million tons of new ships. The builders are complaining of neglect, declaring these yards, by coöperation with the government and necessary extensions, could produce at least three million tons—half of the required tonnage in 1918.

Bitter complaints also are voiced in Seattle because the United States is not taking advantage of the city's facilities for building airplanes. Almost the total supply of spruce is furnished by Puget Sound, but only 50 airplanes are being made at Seattle. The capacity number, for which contracts are wanted, would be at least 5,000. To make these complaints effective, the business men of Seattle during the third week of January flooded Washington with telegrams, urging the government's war managers to make greater use of this "Titan among the industrial cities." In support of their contention they set forth the following facts:

Seattle has hydroelectric power at the lowest rates in the United States, of which only 190,000 hp. has been developed. The amount easily could be multiplied four times.

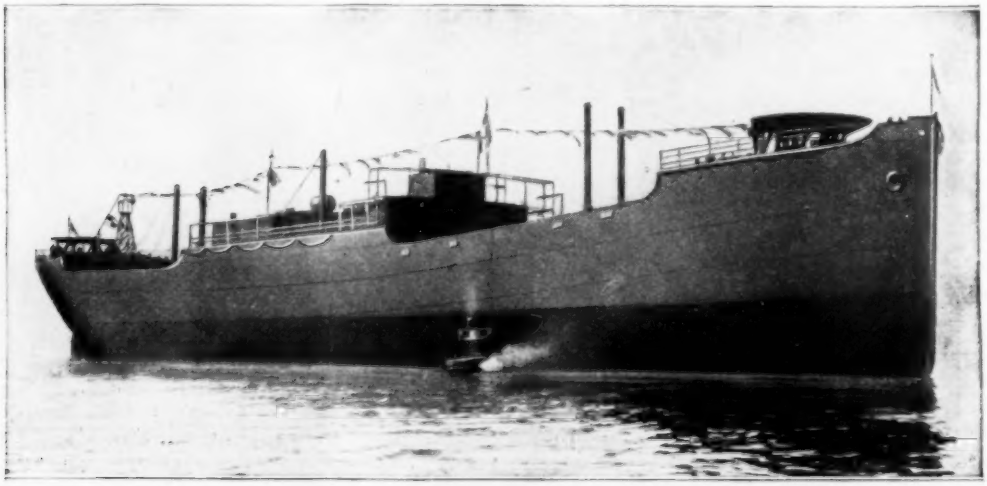
Thousands of men work out of doors the year round, attaining the highest average efficiency. There are no extremes of heat or cold.

There is a plentiful supply of coal, with prompt deliveries every month in the year. There are six transcontinental railroads and a $10,000,000 system of deep-water terminals.

During the month of January ocean ships brought 260,000 tons of raw materials from the Orient and returned with capacity cargoes.

Seattle has 1,200 factories covering six square miles, of which only a small percentage is now used in war industry, and 140 miles of water front afford sites for new factories and branches.

Instead of having only 28,000 men busy on war work, as at present,



The "West Arrow," a Steel Vessel with a Carrying Capacity of 8,800 Tons Which was Launched at Seattle, at the Same Moment as the "Ypres"

A Very Convenient and Attractive Two-Car Garage Which Cost $1,020, Including Complete Equipment. Right: Opening One of the Garage Doors Which are Hung on Swiveled Ball-Bearing Supports That Travel on a Curved Track

Seattle declares itself able to keep 100,000 busy, without losing an hour's labor at any time of the year.

The appeals declare the aim to be maximum service to the nation and no desire to obtain profits from war contracts.

The leading business men joined in this statement: "Seattle doesn't need profits from war business. The city is rich in material wealth. It will develop into a world metropolis after peace is restored, through its gigantic foreign trade alone. Enough wealth will flow from Siberia and the Orient to build half a dozen great port cities. Seattle's industries are immune from coal famine, costly power, and inadequate transportation. Being immune, it can help tremendously in this crisis in averting disaster to the national cause, hence the appeals for recognition."

ATTRACTIVE GARAGE MEETS MANY REQUIREMENTS

A farmer's garage, the plan, appearance and construction of which make it a particularly desirable improvement for town or country property, is shown herewith. It is a frame structure housing two cars for which two large doors are provided. These doors are each hung on swiveled supports that travel on a track extending over the doorway and along the adjacent side. When open, each door hangs close to the side wall, leaving the entire passage free for a car to pass. A small door between these two larger ones leads to the chauffeur's quarters on the second floor which is lighted by two dormer windows at the rear. Here also seed is kept. This building, together with others on the farm, is supplied with electricity from a plant on the first floor. Underground pipes connected with the residence heating system keep the garage at the proper temperature in winter.

ADJUSTABLE SPOUT FEATURE OF SELF-MEASURING OILER

Convenient features for the motorist are embodied in a self-measuring oilcan which is supplied with an adjustable spout that will reach the oil opening of an engine without requiring the use of a funnel. A button provided on the handle controls the flow, while a gauge situated in plain view registers the contents and indicates the amount being discharged.

¶ It is stated that about 200 board feet of wood is used in constructing the average aeroplane, but to obtain material of proper quality 1,500 ft. of select lumber must be worked over.

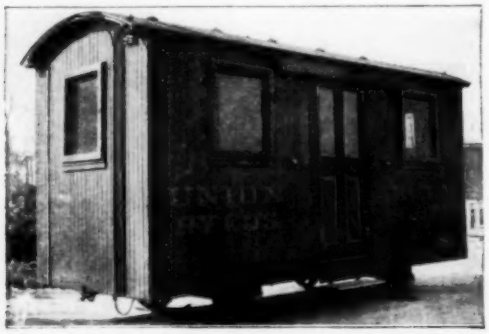
COLLAPSIBLE COOKING KIT USES PREPARED FUEL

A new aluminum mess kit for soldiers or campers, designed to burn prepared solid fuel, is adapted to a surprising number of uses. For example, beans, soups, and coffee can be prepared in various compartments at one time, the coffee being brought to a boil in a few minutes. Set up for such service, the outfit stands 9 in. high, but when the parts are nested it is only 3¾ in. high.

A Collapsible Camp Kit That Burns Prepared Fuel Cubes: The Brazier and Its Containers are So Designed That the Wind will Not Blow Out the Fire

TEMPORARY WAITING ROOMS USED BY CAR COMPANY

At outlying points in the Bronx, where waiting rooms are needed only part of the year, a New York surface-traction company employs portable stations. These are provided with cane-covered benches, electric heaters, and double swinging doors. They are mounted on wheels so that they may be moved wherever required and then placed conveniently adjacent to the tracks.



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One of the Temporary Waiting Rooms Used at Outlying Points on a New York Street-Railway Line during Inclement Weather

CATTLE GUARDS ELIMINATE GATES ON RANCHES

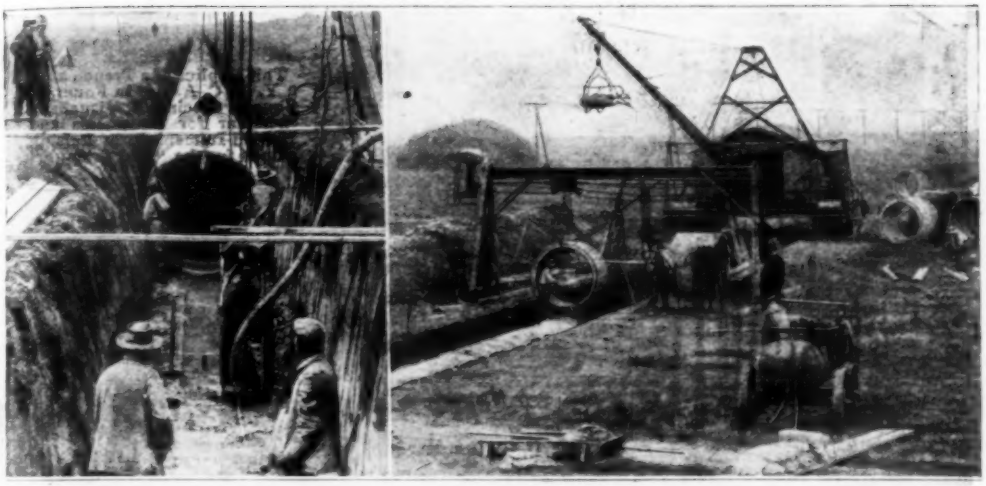
In the region of the big cattle ranches of the Southwest, where public highways are infrequent and roads run through fenced grazing lands, cattle guards, somewhat like those installed at railway grade crossings, are employed so as to dispense with gates which are a source of inconvenience and delays to motorists. Where the road passes from one field to another the wires are removed between two posts and a pit dug the length of the gap. This is bridged by logs laid crosswise of the road and a few inches apart. These serve to carry cars across but, being rather widely spaced, cattle will not venture on them.

MAY CURTAIL ICE MAKING FOR LACK OF AMMONIA

During the past winter the Food Administration has made special effort to have a large amount of natural ice harvested because of the possible shortage of ammonia for making artificial ice next summer. In a recent statement, this branch of the government declares that the outlook in respect to the ammonia supply is by no means as promising as has been indicated in some quarters. While it is not so stated, it would appear that the commandeering of ammonia at some points would be a possibility.

CITY'S SEWAGE DISCHARGED THROUGH CONCRETE MAIN

Salt Lake City's new sewage-outlet system, constructed at a cost of about $100,000, provides facilities adequate for a future population of 500,000 persons, and is therefore several times

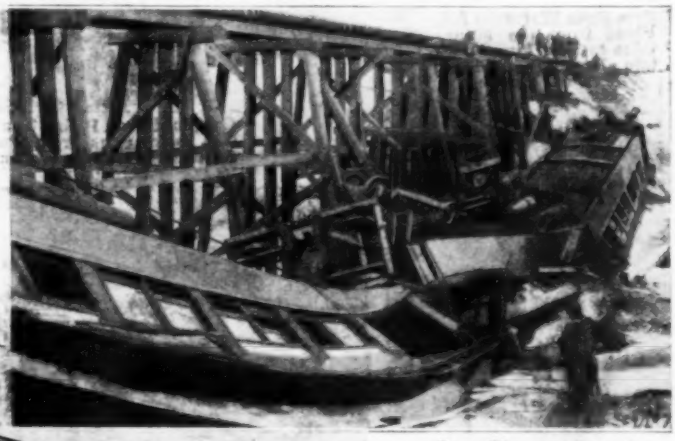


Left: Trench View of Sewage Conduit during Construction. Right: Lowering One of the Five-Foot Reinforced-Concrete Pipe Sections into Place. The Main Is Nearly Five Miles in Length

larger than is needed at present. It consists of a five-foot reinforced-concrete main nearly five miles in length. While gravity takes care of the flow, it is necessary to elevate the sewage into the disposal main. This is accomplished by an electric pumping plant at the inlet to the line, which establishes a connection between it and the city service mains.

BROKEN RAIL ON BRIDGE CAUSES BAD WRECK

The fact that a broken rail, which caused a train wreck in Kansas, happened to be on a wooden-trestle bridge made the disaster more serious than it otherwise might have been. The defective part derailed the engine, which continued across the structure on the ties. This pounding of the timbers, investigators afterward found, seriously weakened the bridge and may have aided in hurling all but the first coach down into the ravine, which was 30 ft. deep. Three persons were killed and a score were injured.

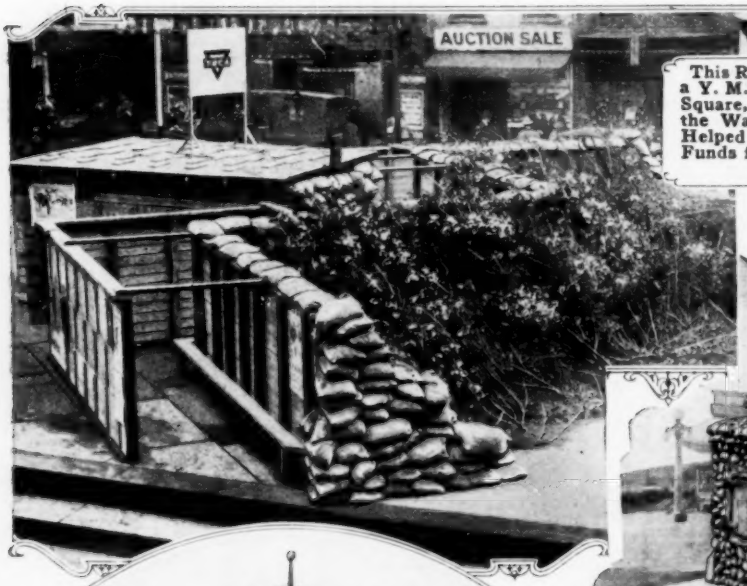


Cars Thrown into the Deep Ravine after being Derailed

Engine and First Two Cars after Crossing the Bridge

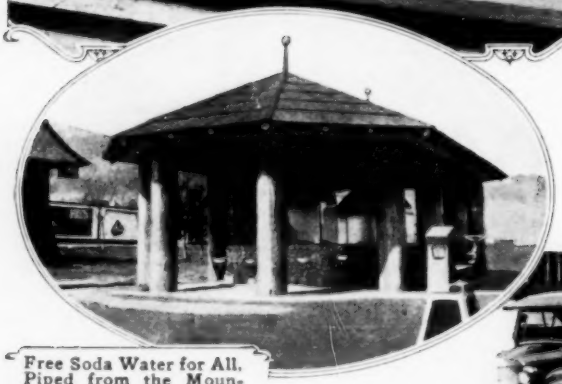
AND ENJOYMENT OF RESIDENTS AND VISITORS

CIVIC FEATURES THAT PROMOTE THE COMFORT



This Replica of a Trench and a Y. M. C. A. Hut in Fountain Square, Cincinnati, Visualized the War for Thousands and Helped Immensely in Raising Funds for the "Red Triangle" Organization

Fountain of Beach Stones, Erected by Women and Children of Manhattan Beach, California, for Man and Beast



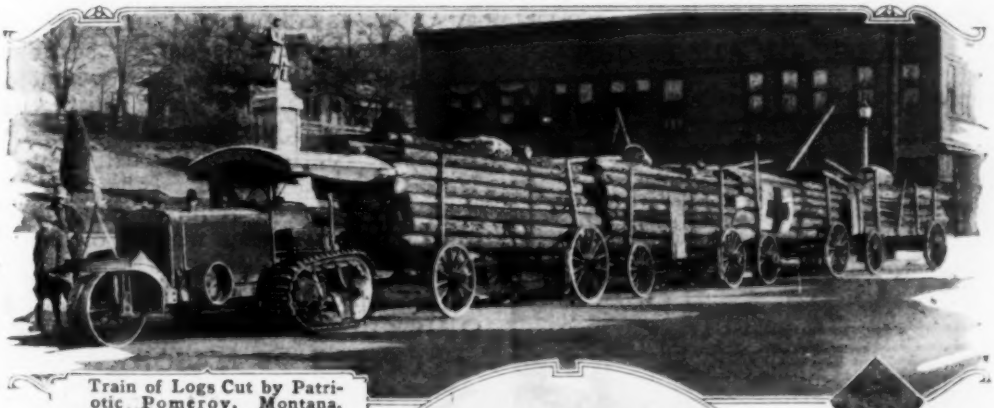
Free Soda Water for All, Piped from the Mountains to This Fine Fountain Near the Ashland, Oregon, Depot

Guards of Steel Piping That Protect Pedestrians from Passing Automobiles While Waiting for Street Cars

Chute to Subpavement Trash Holder in Astoria, Oregon

A Very Popular Municipal Auto Bus That Makes a Five-Mile Tour of a St. Louis Park for Five Cents

AND ENJOYMENT OF RESIDENTS AND VISITORS



Train of Logs Cut by Patriotic Pomeroy, Montana, Men and Hauled 28 Miles to Prevent a Fuel Famine: All Profits Went to the Red Cross

A Los Angeles Street Marker: A Concealed Bulb Lights Street Names at Night

Pennants in Front of This 26-Foot Diving Tower in Cincinnati Mark Off the Deep-Water Area

Ornamental Sign in Columbia, Missouri, with Helpful Data for Motorists

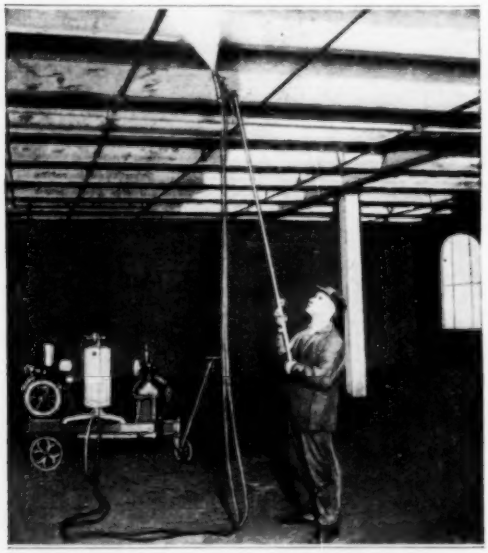
Deer Lodge, Montana, has Shown Its Pride in Local History by This Statue of a Pioneer Trail Finder

A Massive, Ornamental Marble Seat for Pedestrians in Salt Lake City

Wooden Red Cross That will Stand in Missoula, Montana, until Peace Comes

SIX-FOOT HANDLE EXTENDS RANGE OF AIR BRUSH

An improved type of air brush makes it possible to paint a high ceiling, or any other equally distant surface, without the use of a ladder or scaffold. The nozzle is provided with a handle, some six feet long, to which is attached a set of levers that give the operator the same control of the brush as if it were held in his hand. It is claimed that less paint is required when applied in this way than with an ordinary brush.



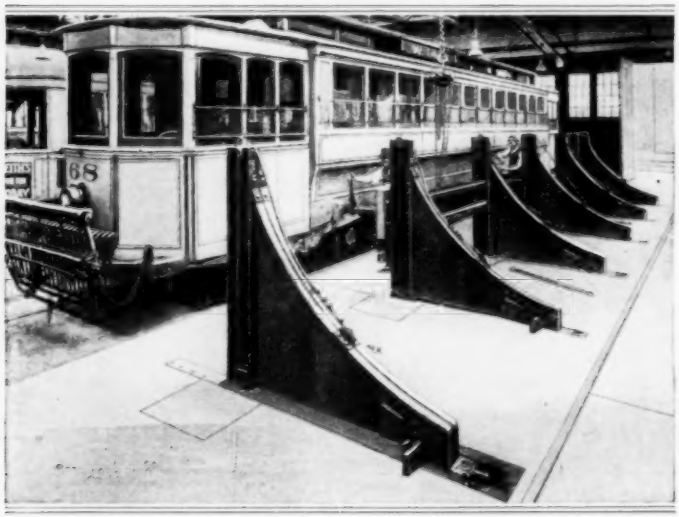
Two Examples of How the Long-Handled Air Brush Eliminates Ladders and Scaffolds: The Paint can be Applied Several Times as Fast as by Hand

QUICKLIME USED TO WRECK PIERS OF MASONRY

Quicklime was put to unusual use not long since in tearing down several piers of brick masonry that were too near other structures to be destroyed by dynamite. Rows of holes, 3 in. in diameter and 3 ft. deep, were bored every 3 ft. in the tops of the piers and filled with freshly moistened quicklime to within a few inches of the top. A layer of brick dust was tamped in above the lime. The expansive force of the filling in the holes soon caused cracks to appear in the masonry, making the wrecking of the piers a simple matter.

HEAVY STEEL BRACES FORM TRUING VISE FOR CARS

As a result of collisions, the chassis of steel cars are occasionally thrown out of alinement. To facilitate the work of straightening them, one company has equipped its shop with a series of heavy steel braces that are arranged on opposite sides of a track. When a damaged car is brought into position between the uprights, which serve as supports for jackscrews, it can usually be pressed into shape without difficulty. The braces are pivoted so that when not in use they are swung through the floor, out of the way. By their use much work, which otherwise would be necessary, is eliminated entirely.



The Steel Frame of the Car is Pressed into Alinement by Placing Screws between It and the Braces

UNIVERSAL FARM TRACTOR OF MARKED SIMPLICITY

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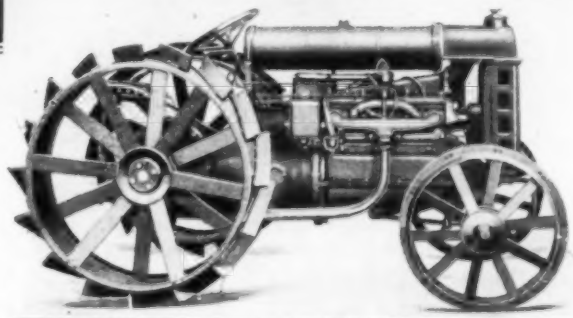
Showing the Tractor in Operation Pulling a Self-Lifting, Two-Bottom, 14-Inch Plow at a Speed of Slightly Less than Three Miles an Hour



Simplicity Is the Outstanding Characteristic of the Machine. The Wheelbase Is only 63 Inches and the Tread—between the Wheels—38 Inches. The Engine is Bolted to the Transmission Housing and the Frame Eliminated

To meet the needs of the average farmer, a small, sturdy-looking tractor of low initial cost and understandable construction has made its appearance. Because it is built for the agriculturist who does not profess to be a master mechanic, it is devoid of frills and possessed merely of bare essentials consistent with reliable performance. The wheelbase is only 63 in. and the tread — between the wheels — 38 in. The engine is bolted to the transmission housing, the frame eliminated, and the load carried on the front and rear axles.

A four-cylinder motor that develops 22 brake horsepower is equipped with a vaporizer to permit the use of kerosene as fuel, after starting with gasoline. Dust is prevented from reaching the cylinders and injuring their walls and the pistons by an air washer. This is filled with water through which the air is drawn by the suction of the motor. Upon reaching the top of the vaporizer, the air is moist and free from foreign particles. Cooling of the engine is accomplished with a conventional thermosiphon system. The transmission is of the selective-gear type with three speeds forward and one reverse. The rear wheels are 12 in. wide and are fitted with cleats to afford proper traction in the field. The machine turns in a 21-ft. circle and is designed to pull a self-lifting, two-bottom, 14-in. plow at a rate of about two and three-quarters miles an hour. The clevis shackle of the latter is attached to the center hole of the tractor's drawbar without the use of chains or other flexible connections, so that backing is permitted. Both the tractor and plow are controlled from the driver's seat without any difficulty.

ALLIED SOLDIERS SALUTE IN DIFFERENT WAYS

The mingling of our soldiers with those of our allies has brought to public notice the different methods of saluting in vogue in the various armies. When a man of military training performs this act of etiquette the position of his hand and arm are at once an index to his nationality.

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Four Distinct Forms of Salute in Vogue in the Allied Armies: From Left to Right They Are the French, English, Scotch, and American

FROST TILTS PORTION OF PARK FOUNTAIN

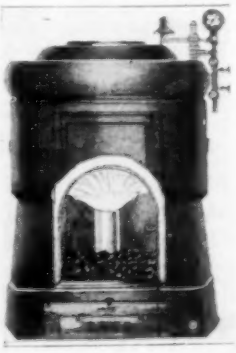
One of the incidental results of the very cold weather in Cincinnati was the tilting of the superstructure of a park fountain so that it leaned like Pisa's famous tower. The frost burst one of the supply pipes and the water, as it overflowed, froze, forcing the fountain ornament decidedly out of plumb and covering the lower part of the pedestal and the basin with an icy cascade.

USE PUZZLE MAPS TO RAISE PATRIOTIC FUND

Two large puzzle maps of the four battle fronts were employed in an unusual way recently in raising money for patriotic purposes. Each map was cut into 1,276 numbered pieces which were distributed to persons throughout a given territory, together with requests for gifts to the patriotic fund. It was explained to those solicited that as the sections were mailed in they would be fitted together on a conspicuously placed board. At all times the appearance of the map was an index to the progress of the campaign. Naturally no one wished to prevent the complete reassembling of the parts and so the plan furnished a special incentive to make a contribution.

FUEL-SAVING ATTACHMENT FOR BOILERS

A new hot-water boiler attachment designed to save fuel consists of an elliptical tube, 10 in. long, suspended in the fire box with its lower end in the fire bed. Extending transversely through the upper end is a slotted pipe, curved downward at the ends, that admits air from the sides. It is claimed that fuel gases are drawn into the lower end of the large tube from all directions and, mixing with air, are consumed, producing an unusually intense heat.



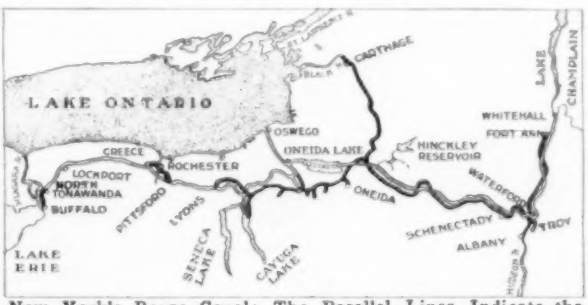
NEW·YORK·STATE·BARGE·CANAL RIVALS·PANAMA·FEAT

By Stanley W. Todd

Three of the Series of Five Waterford Locks Appear in This View. The Five are Said to be the World's Greatest Series of Lift Locks, Their Total Lift Being 169 Feet, or One Foot Less Than the Combined Lift of the Panama Canal Locks

PART I—The Scope of the System

AFTER twelve years of difficult construction work, New York State's great barge-canal system is now practically completed. This remarkable engineering achievement, which gives the state one of the most extensive and efficient inland trade water routes in the world, cost $150,000,000. That big expenditure the state has borne all by itself, without calling upon the national government, although the opening of the canal system in May, this year, is an event that will be of the greatest national import.

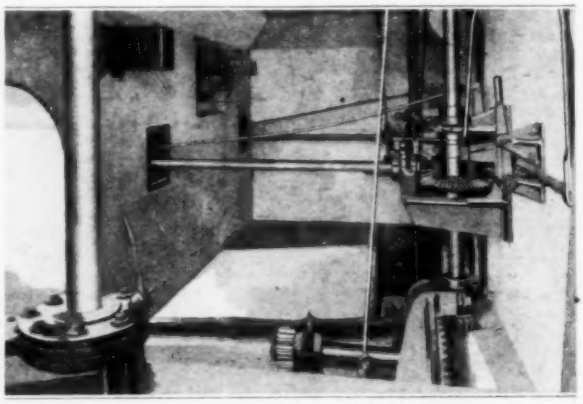


New York's Barge Canal: The Parallel Lines Indicate the New Waterway Which in Places Runs alongside the Old Erie Canal, Shown by Heavy Black Lines, and at Other Points Coincides with It, the Old Channel having been Deepened

The particular value of the New York Barge canal to the entire nation, at this juncture, is that it opens up a new water route from the Great Lakes, across the central part of the state, to the Hudson River, and thence to the Atlantic seaboard. In other words, it links up the middle West, Great Lakes, Canada, and the St. Lawrence River, with the unexcelled shipping facilities on our Atlantic coast. Such a route in these days of great freight congestion, due to war business, will be keenly welcomed.

The new canal is in a position to render important service to the government and to our allies. It will permit the movement of a barge, or a fleet of smaller barges,

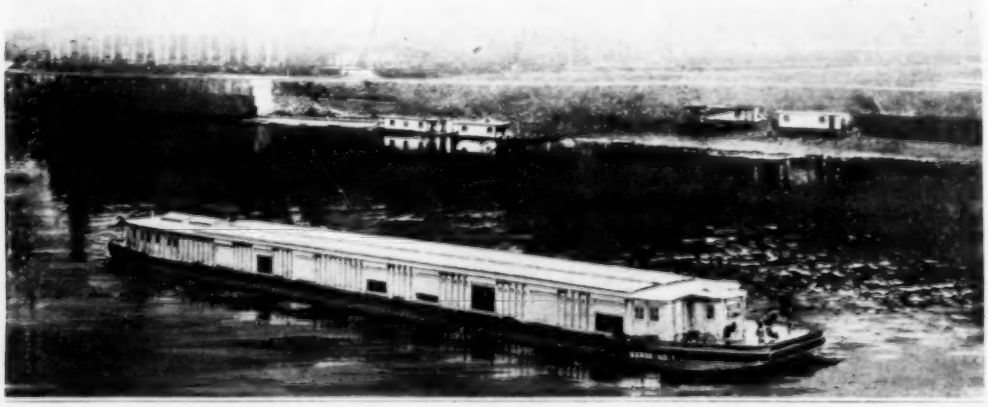
carrying nearly 3,000 tons of freight. It can transport produce at a speed in excess of that maintained by the average loaded freight train, especially during these times. It can help move foodstuffs from points as remote as Duluth, Minn., and carry munitions and ordnance from the manufacturing centers on the Great Lakes and in the middle West, direct to the Atlantic fleet and waiting merchant vessels. Incidentally, a barge of the size and capacity that will ultimately be in operation on the New York canal can handle big guns of proportions that would hamper, if not prevent, their movement on a railroad. Extensive use of the canal, particularly between Buffalo and New York, would aid substantially in relieving the freight congestion and release freight cars required between those points, for use elsewhere where they are badly needed.



Basement of a Canal-Lock Operator's Cabin, Showing Gearing and Shafting Employed in Controlling the Lock Machinery

So much for the national aspects of the New York State canal. For the moment we are more immediately interested in just what the new water route is like, and some of the very unusual methods and inventions installed in building a model canal. In fact, the construction work involved does not suffer by comparison with the Panama Canal. The New York canal is ten times as long and in reality possesses a larger number of engineering works, and incidentally some of the most notable locks in the world, although its construction was not half so spectacular as that of the Panama Canal, nor possessing its international significance. Although more of a local enterprise, the triumph in engineering that the New York canal represents is none the less.

The canal is sometimes called the third enlargement of the state system, but this is not quite accurate, for the state engineers have utilized all the



One of Many of the Smaller Barges Which will Navigate the Canal, Greatly Relieving Freight Congestion on the Railways: The Maximum Capacity of the Barge-Canal Locks Is 3,000 Tons

The New and the Old Contrasted at Lockport, New York: The Big Twin Locks on the Left can Raise and Lower Vessels the Same Distance as the Flight of Five Old Locks on the Right

possibilities of the natural waterways like lakes and rivers, instead of adhering merely to an artificial channel. The nucleus of the system is the old Erie Canal, whose opening in 1825 was regarded an epoch in American history, the route having been approved by George Washington, when he was an engineer and surveyor. As planned by Governor De Witt Clinton, the Erie Canal was 4 ft. deep and 42 ft. wide, floating a boat carrying 30 tons of freight. In 1882, the canal was deepened to 7 ft., permitting the use of boats carrying 240 tons. In 1903, the people of the state decided to enlarge it again to barge-canal proportions, and two years later the reconstruction work was started, which is now finished and gives to the state the splendid canal system it has today.

The New York Barge Canal is not simply one channel running across the state, but four different waterways linked into one system, covering a distance of 532 miles. Of this, 203 miles is a "land line," or an artificial channel; 228 miles a "river line," or canalized river, and 101 miles a "lake line," where the canal crosses a lake. It also connects up with rivers and lakes, thus adding to the territory made accessible.

Four different channels comprise the system, with the reconstructed Erie Canal as the "backbone." This old "ditch," which has been further deepened and augmented, runs from Waterford, near Troy, on the Hudson River, 339 miles west to Tonawanda, where the Niagara River is entered and followed, past Buffalo, to Lake Erie. The Oswego branch of the canal system extends from the Erie north of Syracuse and runs northward to Lake Ontario. The Champlain branch extends northward along the eastern boundary of the state from Troy, which is near Waterford, to Whitehall, at the southern extremity of Lake Champlain. The Cayuga-Seneca branch extends from the Erie west of the Oswego junction and runs southward, connecting the two large lakes from which its name is derived. As the canal system utilizes the Hudson River and therefore reaches New York City, it is actually accessible to approximately seven-eighths of the entire population of the state.

The most interesting mechanical features of a canal are naturally the locks and the devices installed to insure proper maintenance and control of the water. As the New York canal is largely a canalization of natural rivers and lakes, it is equipped with lock systems that have been devised to meet special conditions. Many of them are unique. The channel throughout is 12 ft. deep. In earth sections of the "land line"—that had to be cut through by excavating methods—it is 75 ft. wide; in the rock cuts it is 94 ft., while the bed of all canalized rivers and lakes has a minimum width of 200 ft. The maximum "headway" is 15½ ft.; higher vessels cannot pass under the bridges.

In passing from the Hudson River to Lake Erie, a barge of the size to be used on the canal must be lifted from practical sea level to 572-ft. elevation, the mean water level of the lake. To accomplish this task in the daily operation of vessels, the state canal system is equipped with 57 locks of various types required by local conditions and combining the very latest engineering devices in this field. Every one of the locks is constructed of concrete and operated by electricity, which is generated at hydroelectric stations or gasoline-electric power plants. Each structure is 328 ft. in length and 45 ft. wide, having a usable length of 310 ft. and a maximum barge capacity of 3,000 tons. The locks vary in height of lift anywhere from 6 to 40½ ft. Some of the most prominent locks are located at Waterford, Little Falls, on the Erie Canal, and at Oswego, on the Oswego branch. The five structures at Waterford have a combined lift of 169 ft., or just one foot less than the total lift of all locks in the Panama Canal. These are said to be the greatest series of high-lift locks in the world. The structure at Little Falls has a lift of 40½ ft., and is the second highest single lift lock in the world, while the one at Oswego utilizes the siphon principle, in which air valves control and no electric operation is required. This is the first lock of this type to be constructed in this country and the largest example of siphon lock in existence. It has a lift of 25 feet.

While utilizing the old Erie Canal by deepening and widening it in many places, the barge canal has deviated in several places, making necessary new channels and locks. An interesting example of the improvements in locks is shown at Lockport, N. Y., not far from the western end of the system. The height of 50 ft. is now accomplished by twin locks, placed right beside the flight of five locks of the old system. The new locks, like others throughout the system, are filled with water and emptied by means of culverts, one in each of the side walls, opening into the lock chambers through 20 ports, or openings, located just above each lock floor. The gates are massive steel doors swinging on steel pivots, and weigh more than 200,000 lb. each. They are of the "miter-gate" type and can be opened or closed in about 30 seconds.

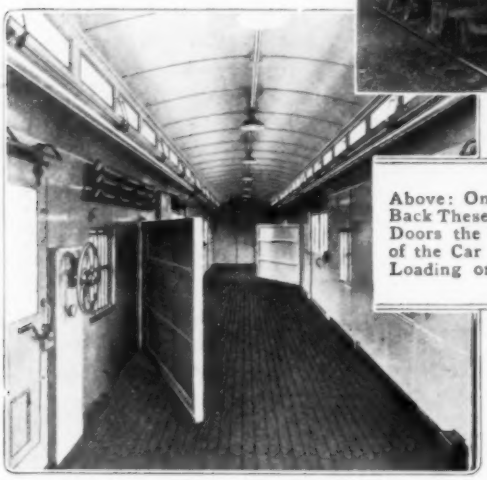
PRACTICAL FEATURES MARK LONG EXPRESS CARS

Several express cars of very unusual length—74 ft.—and possessing special features making them particularly valuable in handling shipments of automobiles or high-bred animals, have been recently put into service on the Baltimore and Ohio Railway. The whole of one end of each car is composed of two big doors which, when opened, will admit any article whose dimensions are not greater than those of the car's interior. Set in these doors, which are strongly reinforced to give the body proper strength, is a small door through which trainmen can pass to the adjoining coach. A set of stall partitions, nested at one end when not in use, provide accommodations for 24 animals when set up. There are three doors on each side, the center one being extra large for handling bulky packages. By means of movable partitions express matter can be kept

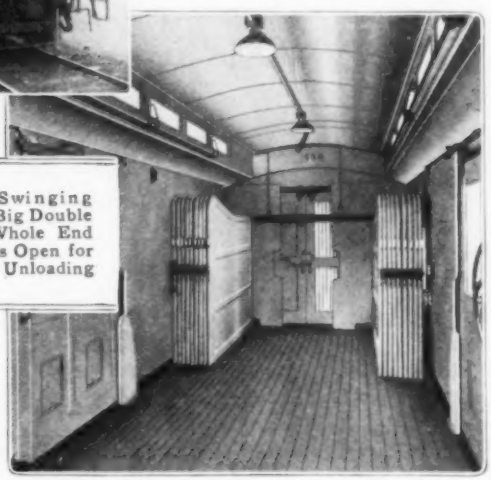
One of Several New Express Cars, 74 Feet Long, Especially Designed to Handle Large Articles and High-Bred Animals

Below: The Partitions Used to Separate the Express from the Baggage, and the Perforated Metal Guards behind Which Are the Steam Pipes, are Shown Here

Below: The Movable Stall Partitions are Shown Nested in This End of the Car



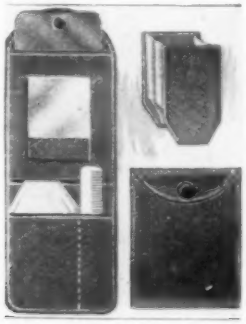
Above: On Swinging Back These Big Double Doors the Whole End of the Car Is Open for Loading or Unloading



separate from the baggage. The steam pipes are imbedded in the side walls and covered with perforated metal to prevent contact with the car's contents.

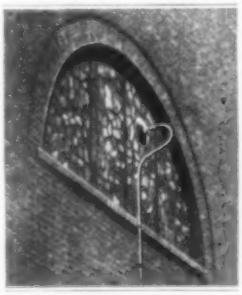
POCKET-SIZE TOILET KIT FOR SOLDIERS

For the convenience of soldiers and travelers a holder of toilet articles has been devised of waterproof khaki which, when folded, fits into the pocket. It contains a rust-proof metal mirror, an aluminum comb, and a sanitary drinking cup that folds flat.



CHURCH WINDOW IS LIGHTED BY ELECTRIC LAMP

To illuminate a stained-glass window in an old New York church that is cut off from sunlight by a tenement building, an electric lamp is used effectively. A gooseneck bracket, attached to the outside wall, holds a bulb and reflector near the middle of the semicircular window. The light is flooded across the colored glass so that to those in the edifice the effect is comparable with that formerly produced by the sun's rays.



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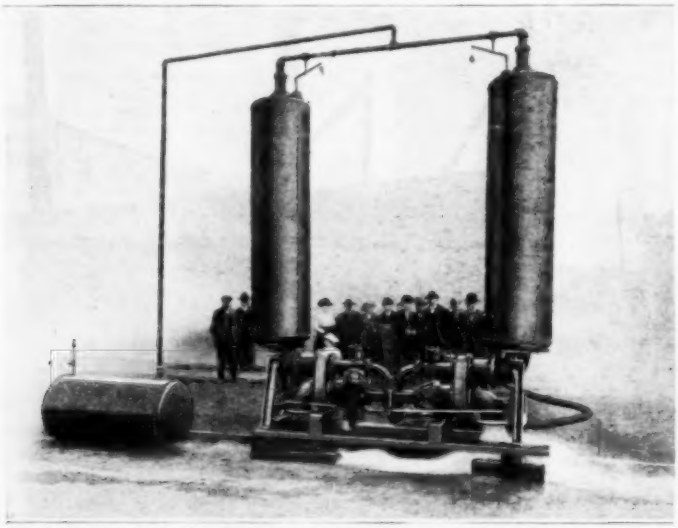
HYDROPNEUMATIC COMPRESS OF SIMPLIFIED TYPE

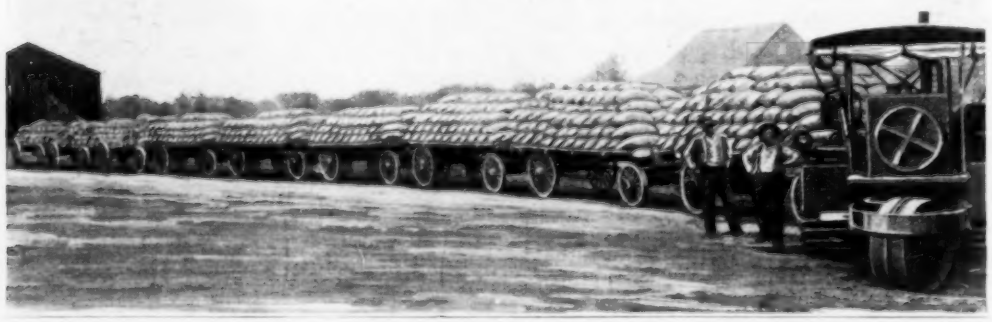
Because of its manifest simplicity, a hydraulic air compressor that has lately made its appearance is claimed to be highly efficient in operation. Waste of energy is reduced by employing a direct means of converting hydrostatic to pneumatic power. The apparatus consists principally of two vertical cylinders from which air is forced by the introduction of water under high pressure. Automatic control of a two-way admission valve installed at the union of the intake pipes causes the flow to be diverted to one tank while the other discharges its water. This alternation makes the action of the compressor continuous, unless air is being supplied faster than it is used. In such a case it temporarily ceases functioning until the pneumatic pressure is reduced. The system is intended for use where water under heads of from 200 to 350 ft. is available for operating purposes.



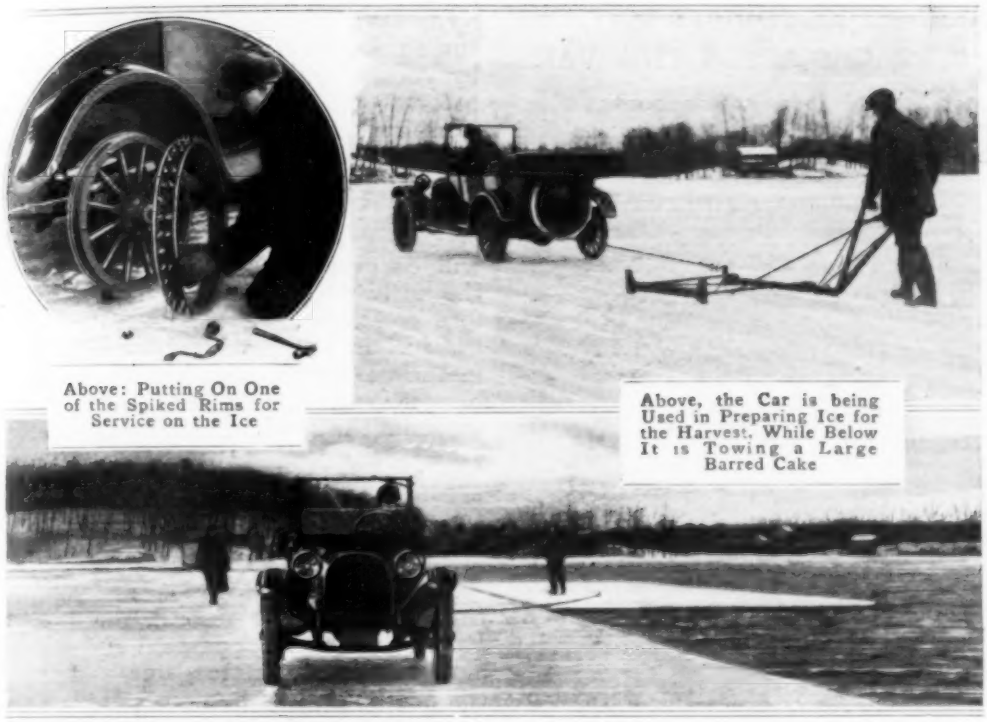
The Compressor in Operation, Converting Hydrostatic to Pneumatic Pressure: Air is being Forced into the Horizontal Tank at the Left

TRUCKS AND TRACTORS MOVE DOMESTIC RICE TO COVER

Sacramento Valley's recent rice harvest was so bountiful that unusual measures had to be employed in getting it under cover before the outset of the rainy season. Fleets of motor trucks were obtained from adjacent cities for transporting it to warehouses. Tractors, slow-going but powerful, were also pressed into service and made to pull long, heavily loaded wagon trains. While, compared with the world's rice yield, California's production is small, the industry has made a surprising growth since its inception some seven or eight years ago.



Tractor-Drawn Wagon Train Moving Harvest of One Farm to Warehouse in Another County—a Picture from the Rice-Growing District in Sacramento Valley, California



Above: Putting On One of the Spiked Rims for Service on the Ice

Above, the Car is being Used in Preparing Ice for the Harvest, While Below It is Towing a Large Barred Cake

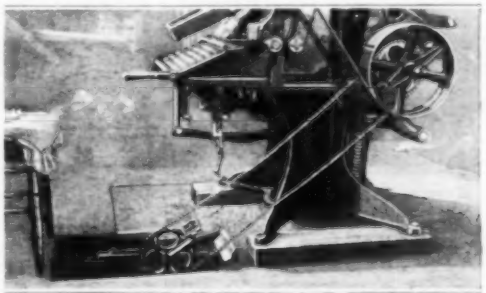
AUTO BETTER THAN HORSES FOR HARVESTING ICE

That a motor car can be used to better advantage than horses in cutting ice was shown recently by a Massachusetts man who had a large ice contract to fulfill and was unable to obtain enough men and horses to do the work. In the emergency he utilized a medium-priced car, equipping the rear wheels with demountable rims in which were set two rows of 1-in. spikes. The automobile proved entirely satisfactory in drawing the marker and grooving plow, and later was driven alongside the open water, towing large barred cakes much faster than men could push them. It was found that the ice could be cut about three times as fast as with horses.

CArmy life in France has shown that larger shoes are needed by many of our soldiers and it has been recommended that size 5 and all A-widths be dropped from the lists of available sizes, and that sizes 13 and 14 be added.

LINOTYPE MACHINE RUN BY FOOT POWER

Pending the installation of electric connections in his newspaper office, a publisher ingeniously equipped his linotype machine for operation by foot power, by mounting bicycle pedals and a sprocket wheel in a recess in the floor and connecting them by a chain with

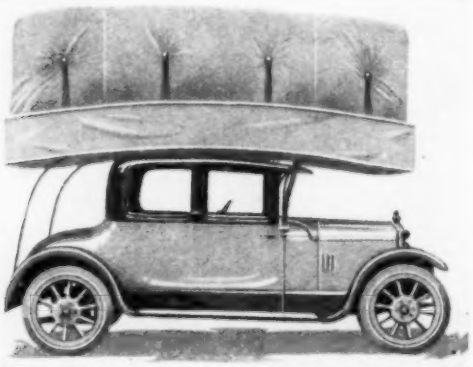


Linotype Machine Connected by a Chain with Bicycle Pedals and a Sprocket Wheel so That It can be Operated by Foot Power

the machine. After some practice the operator was able to maintain almost uniform speed.

BRITISH MOTORISTS MAY USE COAL GAS AFTER THE WAR

It has only been a few months since coal gas first began to be used as fuel by British motorists. It appears, however, that as early as last December there were more than 1,000 machines using London streets and rural highways with the ungainly gas bags fastened to their tops. By this time the figure has undoubtedly been doubled. The particularly interesting aspect of the situation, now that the novelty of the scheme is passing, is the growing conviction that the war's end will not mean that motorists will promptly resume using gasoline. Coal gas is seen by certain authorities as the emancipator of the car owner who had paid exorbitant prices for fuel in normal times. When war's exigencies no longer prohibit the use of high-pressure steel containers, the practicality of coal gas for automobile purposes will be greatly enhanced. Therefore the feeling prevails that gasoline is forever dethroned as the exclusive motor fuel in the British Isles. In the meantime flexible containers less cumbersome and far more sightly than those first introduced, are being made.



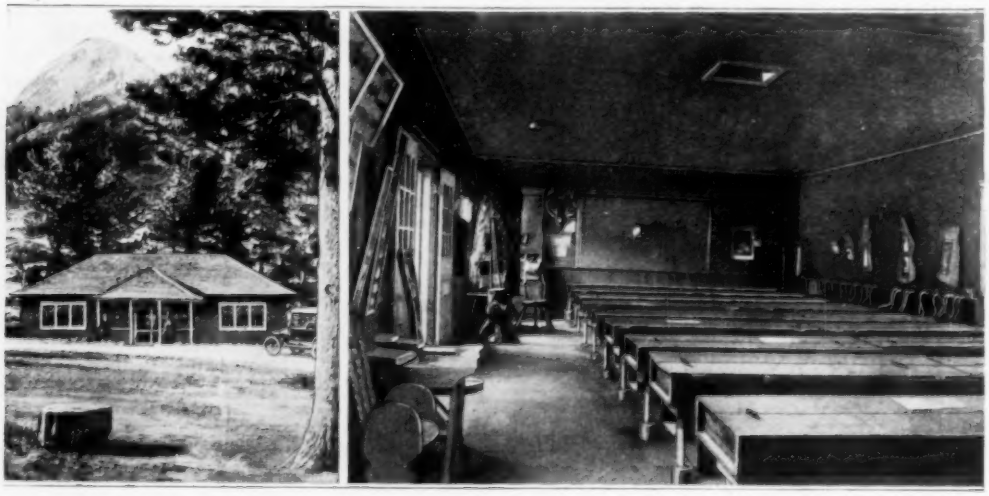
COURTESY ILLUSTRATED LONDON NEWS

The Smart Coupé of a British Army Captain's Wife, Fitted with One of the More Sightly Gas Containers That are Now Making Their Appearance

RAISING TROUT FOR SUMMER BOARDERS IN COLORADO

Because of its location at one of Colorado's popular resorts, the Estes Park fish hatchery, operated under the authority of the state game and fish commissioner, has become one of the show places of the region. Although it consists principally of a small frame bungalow filled with a number of long wooden troughs, it was visited during a four-month period last year by 14,580 persons.

While its success as a reception hall for summer boarders is apparent, it serves a greater and more interesting



Nearly 15,000 Persons Visited the Hatchery, Shown at the Left, during a Four-Month Period Last Season. A Row of Troughs Inside of the Building is Pictured at the Right

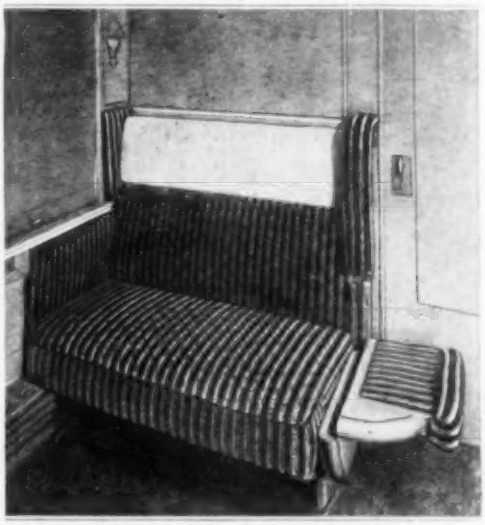
junction. The entertainment of tourists is one of the state's important activities. And more folks than one might suspect choose their playgrounds by the fish that stock its streams.

So to the Estes Park hatchery falls a generous share of the work of keeping Colorado's mountain streams attractive to outers. Were it not for artificial propagation, fishing there would be but a memory of days gone. As it is, some 2,500,000 young trout are placed in brooks and lakes annually. Three varieties are bred, for singularly they seek different altitudes. The rainbow trout, native of California and Oregon, are propagated for the waters below an elevation of 7,000 ft. The eastern brook trout, of New England habitat, stay between 7,000 and 8,500 ft. And the black-spotted trout, native of Colorado, go as high as fish can climb.

Every visitor at the hatchery is introduced to "Sunbeam," a trout used as an example of the care necessary in handling fish. The law as well as the rules of sportsmanship decree that undersized fish must be returned to the water when caught. As "Sunbeam" and his keeper have demonstrated to more than 28,000 persons in the past two years, one's hands must be moistened before grasping a fish. Otherwise their dryness will remove the slime and induce a fungus growth that sooner or later kills the fish. Intelligent handling is responsible for "Sunbeam's" sturdy condition.

COUCH-FORMING SEATS USED IN PULLMAN COMPARTMENTS

Drop-end seats that may be converted into couches offer occupants of Pullman compartments on one of the Chicago and North Western Railway's crack trains the opportunity of reclining comfortably at any time during the day. The arm rest is hinged so that when turned down it forms an extension to the seat. By making this adjustment and banking a couple of pillows at the opposite end, an improvised lounge is supplied. If two persons are traveling together, one of them may thus recline without discommoding the other. The arrangement also adds considerable width to the lower berth. The feature, of course, has to be confined to compartments.



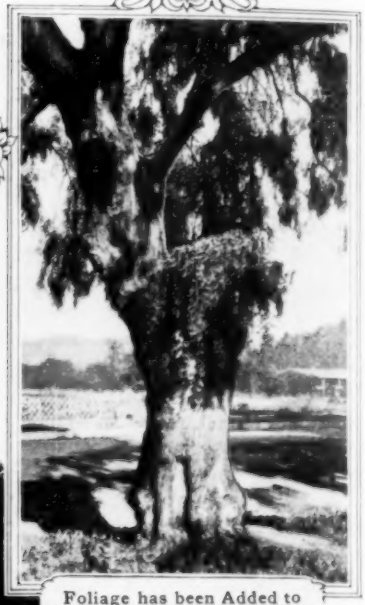
By Dropping the Arm Rest and Piling Pillows at the Opposite End, the Seat is Converted into a Comfortable Couch

STOREROOM IN HILLSIDE BEHIND CEMENT WALL

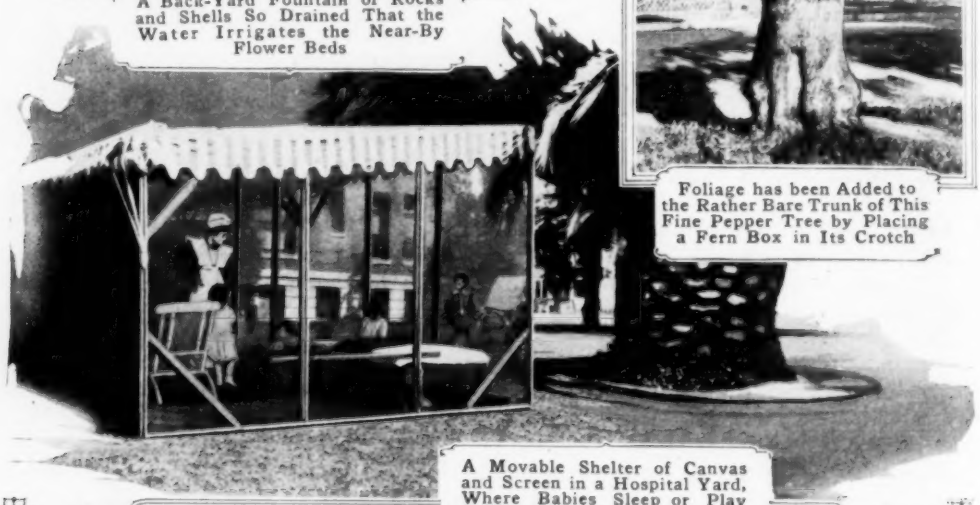
When it was decided to erect a retaining wall in a hillside at the back of a city lot, the owner determined to utilize the improvement by making a concrete cellar, or storeroom, behind it. Consequently he first built the back, sides, and roof of the chamber, and when the wall was erected across the front, a door was made in it leading to the room. Here fruits and vegetables, as well as tools, are kept in a temperature that varies very little.

INTERESTING GLIMPSES OF YARDS AND DOORWAYS

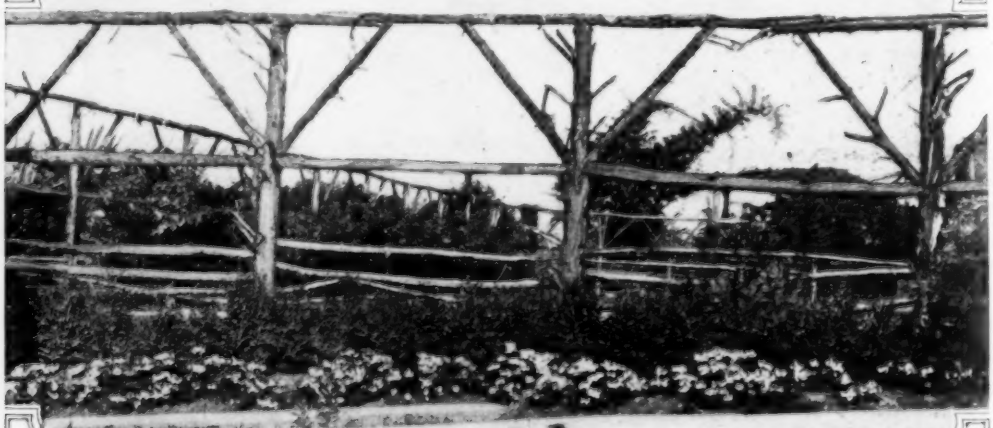
A Back-Yard Fountain of Rocks and Shells So Drained That the Water Irrigates the Near-By Flower Beds



Foliage has been Added to the Rather Bare Trunk of This Fine Pepper Tree by Placing a Fern Box in Its Crotch

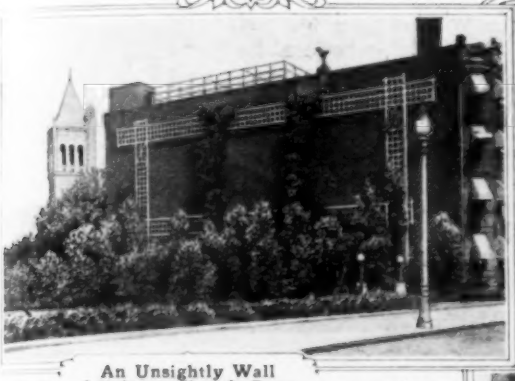


A Movable Shelter of Canvas and Screen in a Hospital Yard, Where Babies Sleep or Play Outdoors and Away from Flies



Rustic Tennis-Court Backstop of Cedar and Eucalyptus Timbers, Partly Hidden by Shrubbery: The Structure Cost Much Less Than One of Finished Lumber and Is More Pleasing

THAT SHOW ORIGINALITY AND ARTISTIC TASTE



An Unsightly Wall Adjoining Church Property, Beautified by a Trellis, Vines, and Shrubs

A Patriot's Front Door about Which Tomatoes and Squashes were Grown: Arrows Point to Several Big Squashes

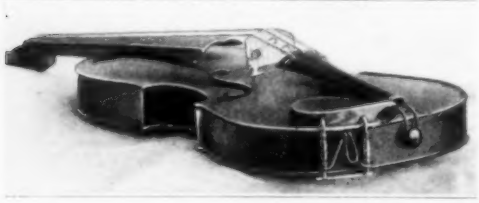
A Novel Decorative Effect Obtained by Training Gourds about the Top of a Slender Upright

Two Artistic Flower Boxes Obtained by Halving an Old Galvanized Hot-Water Tank: They are Painted to Match the Foliage

This Artistic Footbridge, Made by the Owner, Has Every Appearance of Being of Solid Concrete, Though All but the Floor is Plastered over a Very Adaptable Kind of Metal Lath

HOOK FOR VIOLIN GIVES PLAYER MORE FREEDOM

In order that a violinist may be relieved of gripping his instrument be-

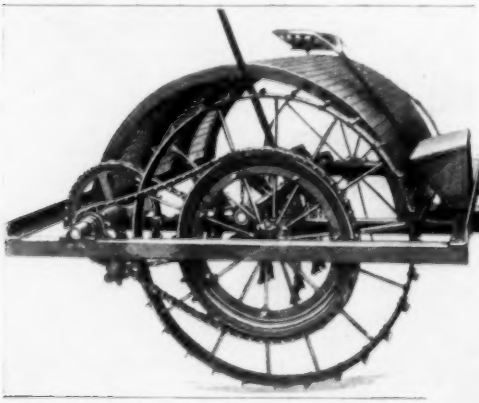


A Violin with a Hook Attached to the Chin Rest so That It Will Fit over the Player's Collar

tween his chin and shoulder, a wire hook has been devised that attaches to the chin-rest clamp, and is intended to fit over the player's collar. This affords the musician freer movement of the head and also makes it possible for him to sing and play at once, if desired.

MACHINE DESTROYS WEEDS WITH WHIRLING CHAINS

Whirling chains, having heads that cut to shreds all vegetation that they

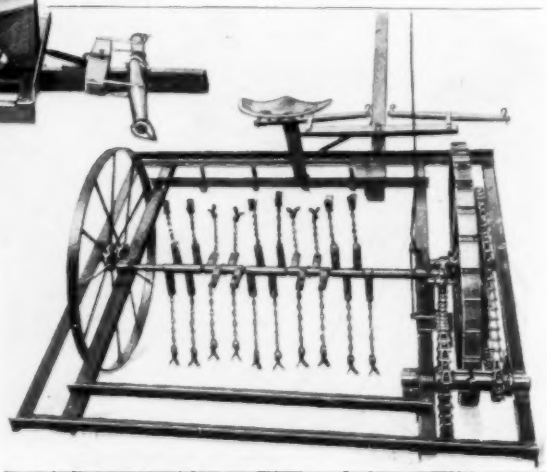


New Weed Destroyer Used in Keeping Down Weeds and Undergrowth on Newly Cleared Land

strike, are the special feature of a new horse-drawn implement coming into use on newly cleared land, to keep down weeds, small bushes, tree sprouts, etc., and so render it fit for pasturing. A rectangular frame is mounted on two 4-ft. wheels and supports a transverse rod to which several beater chains, as they are called, are fastened. One wheel is connected by gearing with the rod so that the latter revolves at high speed, the chains flailing everything within reach. Stones and stumps are passed over without difficulty, whereas grass, being out of range, is unharmed. A curved guard is mounted above the chains to catch flying fragments.

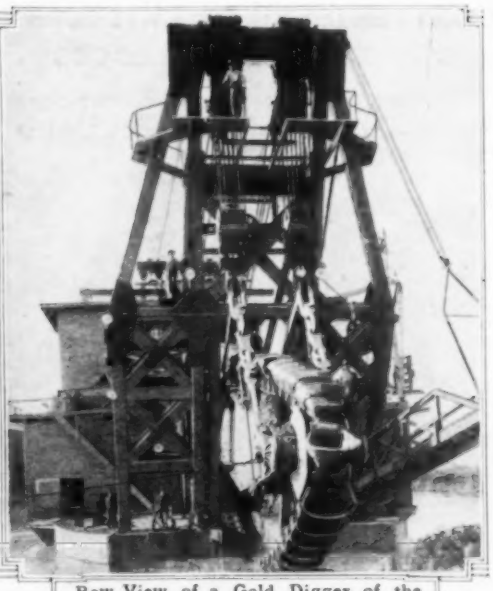
GOLD DREDGE OF BIG SIZE FACES LONG JOURNEY

One of the largest chain-bucket dredges that has ever been built is destined for the Lena gold fields of Siberia. The big machine, constructed on orders that probably emanated from the former czar of Russia, is now nearing completion. Its size, and the remoteness of the region to which it is bound, make the problem of transportation a considerable one. More than a year will be required in delivering it from the middle-western city where it has been fabricated, to a point some distance from the mouth of the Vitim River, where it is to be used. The digger is equipped with 17-cu.-ft. buckets that will give it an estimated output of 310,000 cu. yd. a month. It is designed to work to a depth of 80



Rear View with Guard Removed Showing the Gearing, and the Chains as They would Appear with the Machine in Operation

The Big Dredge in the Course of Construction, Showing Its Hull



Bow View of a Gold Digger of the Same Type as the Large One at the Left, but of Much Smaller Capacity

One of the 17-Cubic-Foot Buckets, with an Ordinary Four-Foot One Inside for Comparison, is Pictured at the Left. The Gold-Saving Tables and Dump Conveyor of an Operating Dredge are Shown at the Right

ft. below the surface of the water on which it floats. Its power installation is electrical and has a rating of 1,350 hp. The machine is of a type that has become widely used in placer mining during the last 18 years. About 80 freight cars will be used in conveying the equipment to a Pacific port, from which it will be shipped to Vladivostok. From the latter port it will be taken inland by the trans-Siberian railway to Irkutsk. During the winter months the next leg of the journey, which ends at Kachugie, a small station 170 miles distant on the Lena River, will be undertaken with sleighs drawn by oxen. Shallow-draft barges will then be employed for more than 1,000 miles in reaching a point known as Bodibo on the Vitim River, some distance from the mouth. The last 15 miles will be traversed by rail. This will entail the construction of a narrow-gauge line to the gold fields.

CHAIN OF RETAIL STORES ALL PLANNED ALIKE

To promote efficiency in merchandizing, a concern owning 25 stores in this country has planned each one so that it is practically identical with the others in arrangement and fittings. Customers familiar with one place of business feel equally at home in the others, while clerks on being transferred to a new store have no trouble in locating goods.

CONVENIENCE OF KNITTERS SERVED BY NEW FROCKS

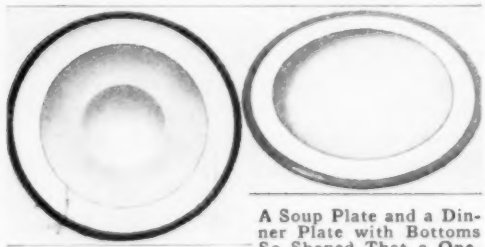
Fashion has introduced a war-time feature in frocks of late design that is

Two New Taffeta Creations Each with Apronlike Draperies That Form the Equivalent of Knitting Bags

of decided utility to knitters. It consists of a full apronlike drapery, hanging down the front almost to the knees, which is gathered at the edge and forms the equivalent of a knitting bag. Ribbons and imitation roses give color to the creation.

WAR NEED MET BY PLATES FOR ONE-ARMED MEN

A type of soup plate has been designed in England for one-armed men which has a small hollow in the bottom from which the last spoonful of soup can be taken without tilting the dish. Dinner plates, with centers sunk more than ordinarily, likewise make it easier for a man having the use of but one hand, to place his food on a fork.



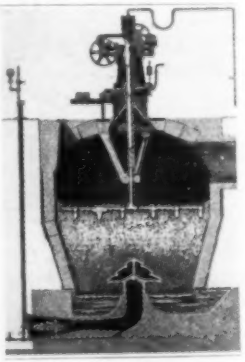
A Soup Plate and a Dinner Plate with Bottoms So Shaped That a One-Armed Person can Eat from Them More Conveniently Than from Ordinary Plates

CHARCOAL SHOWN TO BURN IN RAREFIED AIR

Laboratory experiments conducted of late have shown that a candle flame will become extinguished when the oxygen content of the atmosphere in which it is burning falls to about 15 per cent. Sulphur stops burning when all but 13.5 per cent of the oxygen in an inclosed space has been exhausted. The case of charcoal, however, is notable. Combustion continues until only 9 per cent of the oxygen remains.

GAS-PRODUCER AGITATOR OF FLOATING TYPE

An agitator for gas producers has recently been developed which can be applied to an ordinary hand-poked producer, making it a semimechanical machine and increasing the gasification 50 to 100 per cent, it is claimed. The device is in the form of an inverted tee, having numerous short stirring fingers. Driven by a 1-hp. motor it revolves five or more times per hour, stirring the surface of the fire, preventing the formation of clinkers, and destroying blowholes. Particular excellence is claimed for this agitator because it is of the floating type. On the driving head are two spiral flanges that engage in sliding contact with two lugs on the driving-wheel hub. Should the agitator strike an obstruction the lugs will move along the spiral flanges, causing the tee to rise above the obstacle.



WHAT SHALL I SEND MY SOLDIER BOY IN FRANCE?

By E. T. B.

IT was a triumph of thoughtfulness! To get it ready, Mother and Sis must have labored months, to say nothing of the purchased articles it contained. Dad may have had a qualm or two when he had it taken down by dray to be sent on, but he said nothing. After all, the Kid, sitting in a trench full of mud and water, probably would appreciate it. The army never took much stock in personal comforts for its soldiers.

The delivery department grunted and cussed, when finally it did get across, but the army is very conscientious about such things. The package had to be delivered to Private S. (Yes, although what follows may sound exaggerated, it was an actual occurrence!) Two sergeants brought it to the reserve trench where the Kid happened to be stationed.

"Must think you're going to Berlin in a taxi!" commented one of the carriers, wiping the perspiration from his brow after easing down his portion of the load.

Private S. was delighted to be remembered at last. It had been a long time since anything had come from the folks at home. With fingers that trembled he cut numerous cords and removed cloth and paper coverings. Beneath these layers a neat array of boxes was arranged.

A small crowd gathered. "Gosh, those boxes must be full of bricks, to make it weigh so much!" muttered one of the sergeants.

"How much did it weigh?" queried one of the bystanders.

"Hundred and six pounds!" snorted the sergeant.

To make brief a long story, this is what the Kid found:

Two loosely knitted sweaters.
Two "helmets"—combination scarfs and caps of woolen yarn.
Two scarfs.
Eight pairs of knitted socks.
Six pairs of black shoestrings.
Six pairs of tan shoestrings.
One pair of rubber overshoes with canvas tops.
Three pairs of wristlets, knitted.
Four suits of the heaviest woolen underwear.
Two pairs of fleece-lined buckskin gloves.
One two-burner alcohol stove (without alcohol).
One five-pound box of soft-centered chocolate creams.
One five-pound box of chocolate and divinity fudge.
Five pounds of bar chocolate.
One immense roast turkey, "stuffed 'n everything."
Six jars of sliced bacon.
Six jars of dried beef.
Two hundred expensive cigarettes.
Fifty good cigars.
Ten of the newest books on the war.
Five novels.

There is no necessity to pity Private S. Out of this terrific array he took the cigarettes, two of the cigars, a little of the bar chocolate, and one of the suits of underwear. He donned another of the suits of underwear and one of the pairs of socks, and the rest of the conglomeration he distributed haphazard in his company. As it happened, the pack which he carried already weighed 65 lb., and additions had to come near being necessities. Three

"Two sergeants brought it to the reserve trench where the Kid happened to be stationed . . . 'How much did it weigh?' queried one of the bystanders. 'Hundred and six pounds!' snorted the sergeant."

"Out of this terrific array he took the cigarettes, two of the cigars, a little of the bar chocolate, and one of the suits of underwear . . . the rest of the conglomeration he distributed haphazard in his company."

hours after receiving his package he was four miles from the reserve trench, marching steadily, brightened at having been remembered so lavishly, but a trifle disgruntled at not having a chance to use more of the gift himself.

Of course a good part of that big shipment was useless; it was put together by civilians several thousand miles away, and few errors of omission and commission were forgotten.

Sweaters, unless they are closely knitted—the kind that old ladies make with fine needles and hours of patient effort—are usually not acceptable, because they don't keep out the cold as well as a stuffing of rags or newspapers. Sweaters *are* wanted badly, though, and if you can't make any other kind, send the loose ones, for there are many needy persons under the wing of the Red Cross who don't have even the garments under which to stuff newspapers. For the soldiers—well, watch your grandmother make a sweater! It will be double or triple thickness, and so soft and closely woven that when you stroke it you'll think you are petting an Angora kitten. That's the kind! Helmets—of the knitted variety— rarely are worn. In a few instances they have been used, but except in cases where troops are fairly permanently stationed in dugouts—and in freezing weather—they have no chance, for they are worn almost entirely at night.

Scarfs? Well, as one officer remarked, "Sure! We're glad to get 'em. We don't wear 'em, of course, but the French girls do!"

The knitted socks are, if they are done skillfully, the best bet of all. You can't make a soldier angry with knitted socks, but don't think that he can make use of more than a very few pairs at once.

Nothing can be said in defense of the black shoestrings. The army shoe is tan, and innovations in laces are not looked upon with approval, exactly.

The tan strings are more excusable but scarcely more useful. The soldier has no difficulty getting new shoes long before the first laces are worn out—in fact he has to do so, for shoes themselves don't last very long under the conditions they must meet.

"Scarfs! We're glad to get 'em. We don't wear 'em, of course, but the French girls do!"

Canvas-topped overshoes are laughable. Soldiers now have issued to them rubber thigh boots for use when water, mud, and slush are bad. The canvas tops would give no service under such conditions, and during the few and far-between days that are not wet, woolen socks and army shoes are warm enough for anyone.

Wristlets? Well, the army has progressed as far as wrist watches, but as yet there is to record a case of wristlets.

Heavy woolen underwear is fine, but of course the government furnishes a product which, though it is not as good, is plenty serviceable.

When the weather reaches extreme cold, the soldier simply wears two or three suits of the government brand. Also, the latter does not shrink so badly when washed—the soldier isn't particular about his soap when he gets a chance to wash his underwear.

"An alcohol stove without a supply of alcohol—in a country where alcohol costs more than the best champagne, and is not to be had at any price, often—is the whitest of elephants."

Fleece-lined gloves are fine—only don't get buckskin! You know what water does to this leather!

An alcohol stove without a supply of alcohol—in a country where alcohol costs more than the best champagne, and is not to be had at any price, often—is the whitest of elephants. If you must, send him a dozen "canned heats," but don't bother with the stove.

One good thing to remember, when sending a shipment to France, is that transmission is far from instantaneous. Perishable goods are almost certain to perish in transit. The roast turkey sent to Private S. arrived, but it was interred quickly, and without protest from anyone, instantly its box was opened. Likewise—and this may be a blow to certain candy manufacturers, but it is the truth—chocolate creams, fudge, and all soft-centered candy fares almost as badly in transit as roast turkey. Private S.'s choice assortment had been subjected to alternate heat and cold during the three or four weeks of its travel. Of course, each box was a solid lump, and stale as the skull of Rameses. The bar chocolate fared a little better, for it had been wrapped separately bar by bar.

The dried beef and the bacon were all right. Of course, it must be understood that soldiers are fed well. That is the one thing they can depend on in a life that is all uncertainty. Such a gift as that Private S. received may be useful, and then again it may not, all depending on circumstances.

The cigarettes and cigars are most acceptable. Of course this much can be taken into consideration. It is by no means necessary to send the most expensive variety to your boy. Even the grades of American fags that sell for 10 and 15 cents for 20 are greatly superior to the best French and English brands—according to American tastes, at any rate—so if he has been subsisting on foreign smokes, he will appreciate the cheaper cigarettes as much as the very best Egyptians.

And don't send him books on the war! Coals to Newcastle? Ten to one he knows at least as much about the war as any of the writers, and if he doesn't, you can bank on it that he doesn't want to! No, send him some-

"I asked three soldiers, returned from the firing line, just what they thought should go into one of these ideal packages. Here is the combination."

thing light. Make him forget his troubles. Also, don't send a library at one time, because books weigh like lumps of lead, even the frothiest of them.

Now, last of all, one admonition: Don't send over ten pounds of anything at once! Send him lots of packages; each one is a separate joy in itself, and the sum of happiness from ten 5-lb. packages is infinitely greater than that he can derive from one delivery of 50 pounds.

I asked three soldiers, returned from the firing line, just what they thought should go into one of these ideal packages. Here is a combination of the answers:

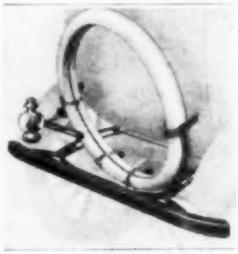
Six candles—never thought of them, did you? Light the boys must have, and often it is hard to get.
Safety matches.
Hard candy. Don't forget; no soft centers!
Cigarettes or pipe and tobacco. Both, if you desire. Cigars don't go as well, because, oh, you know you never get a chance to smoke a whole cigar, and they break so easily.
Powdered milk. They don't issue milk in the trenches.
Knitted socks—two or three pairs of them.
Playing cards—two decks. Yes, and if you are a tolerant sort of individual, one of those miniature stacks of poker chips—the kind that weighs about four ounces.

And—this is by far the most important of all!—a long, newsy letter from home! If there is one thing your boy wants most of all, it is to hear from you. He may go across in a light-hearted manner. He may have enlisted for the sheer adventure or fun of the thing. He may be one of the sober, earnest chaps who knew it to be his duty, and did it, but you'll understand that after he's been there a while, and got the spirit of the whole awful business, he'll feel that he's fighting for you!

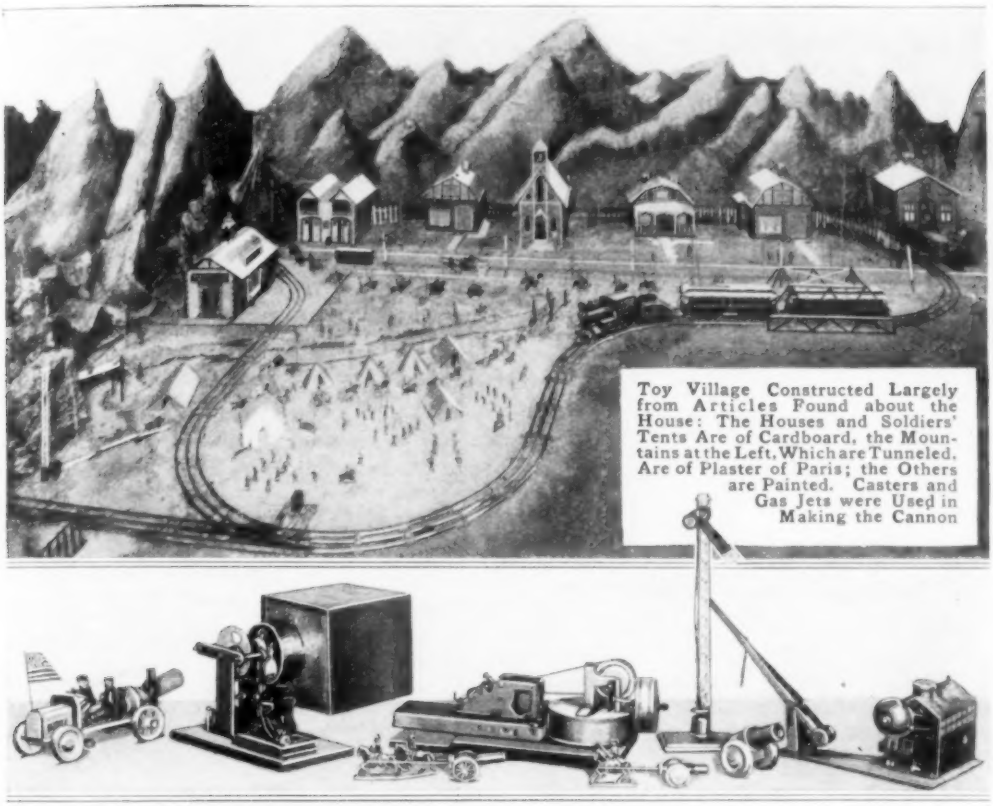
Just one last suggestion. Write your own personal, bright, cheery letter. Get his mother—if you are not his mother—his father, his sister, his sweetheart, his wife—all of his dear ones—to write their words of cheer. Then take a little circular letter around to a few of the men he chummed with, or to his friends at the office. Get them to write a line or two—and they'll all be glad to do it. Then put it all in one big envelope in your express package. Your Richard or Thomas or Jimmy will be the happiest soldier under Pershing when he gets it!

REAR-END BUMPER FOR CAR IS ALSO TIRE HOLDER

Many drivers have found that the back of a car needs the protection of a bumper almost as badly as does the front. In view of this, a special tire-carrying guard has been devised that serves as a rear bumper, holds two casings, and provides brackets for the tail lamp and license plate.



¶Remarkable motion pictures of popular as well as scientific interest have recently been taken with the aid of X-ray apparatus, showing parts of the human skeleton in motion.



Toy Village Constructed Largely from Articles Found about the House: The Houses and Soldiers' Tents Are of Cardboard, the Mountains at the Left, Which are Tunneled, Are of Plaster of Paris; the Others are Painted. Casters and Gas Jets were Used in Making the Cannon

Homemade Apparatus from the Toy Village: The Larger Articles, in Order from Left to Right, Are a Gun Mounted on a Motor Truck, a Music Box Housed in a Cracker Tin, a Motor-Driven Organ, and a Crossing Signal and Gate with a Syrup Can Serving as a Gateman's Cabin

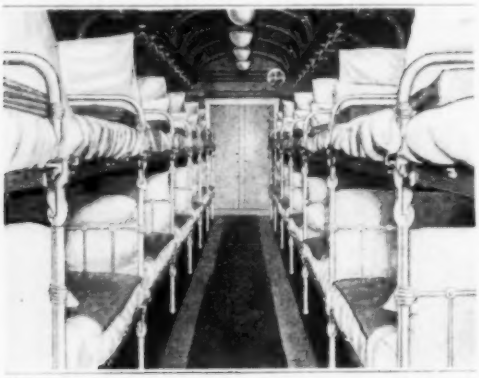
MANY SPECIAL FEATURES IN TOY VILLAGE

Many enlivening features not found in toys offered for sale are provided in an electrically operated toy village made by an electrician in his spare hours. Considerable ingenuity has been displayed in making apparatus from common articles found about the house. Every time the little train crosses the main village street a crossing signal and gate operate automatically. Without outside interference, the train runs up to the depot on a side track, pauses, backs to the main track, and then starts ahead. This is accomplished by means of trips set near the rails. The train on entering a tunnel causes a semaphore to be set. On turning a switch on the control board a toy reed organ in the church, or a music box in the school, starts to play, while the pressing of a button rings the church bell. What appears to be a scattering fire from soldiers on the common is produced by the swaying of a live invisible wire, hung from the ceiling. Whenever it strikes a soldier's metal gun it gives off a spark.

PARLOR CAR RE-EQUIPPED AS AN ARMY HOSPITAL

A 70-ft. steel parlor car has been transformed by the mechanical department of the Erie Railroad into a modernly equipped hospital car and is now being held in readiness for war service. At one end is a receiving and supply room, 10 ft. 8 in. long, containing a fireless cooker, drinking-water tank, washbasin, and supply locker. At the other end is a small rest room

provided with a sofa and lavatory. The central portion of the car serves as a ward, 50 ft. long, containing 14 double-deck cots which will accommodate 28 patients. The cot springs can be adjusted to any position to suit the occupant's need. Besides the necessary bed clothing, each cot is provided with a spread made of a fabricated substitute for leather.



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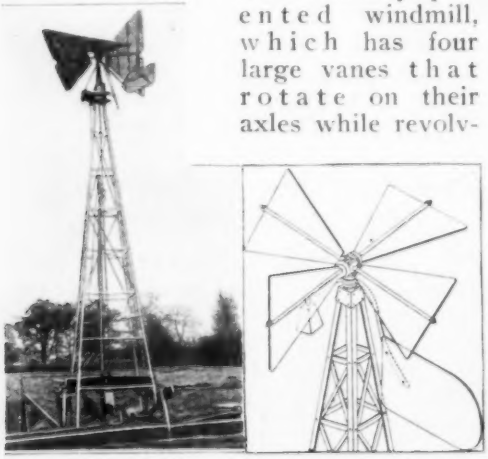
The Ward with Beds for 28 Patients in a 70-Foot Steel Car, Reequipped for Army Hospital Service

WINDMILL HAS FOUR VANES THAT TURN ON AXLES

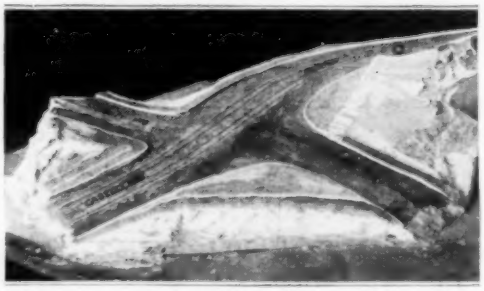
Conventional ideas have been completely disregarded in the construction of a recently patented windmill, which has four large vanes that rotate on their axles while revolving around a vertical pinion connected with the pumping shaft. The spindles of the vanes extend horizontally from a central head and transmit their power through bevel gearing. The vanes are placed on their axles so that when one presents a face square to the wind, the one opposite presents its edge to the wind, while the remaining two will be at quarter turns with reference to the first two. Each vane turns on its axle once while revolving around the head twice. A counterweighted tail attached to a long, bent arm serves to steady the mill. The inventor claims that his mill develops much more power than one of the same size of the fan type.



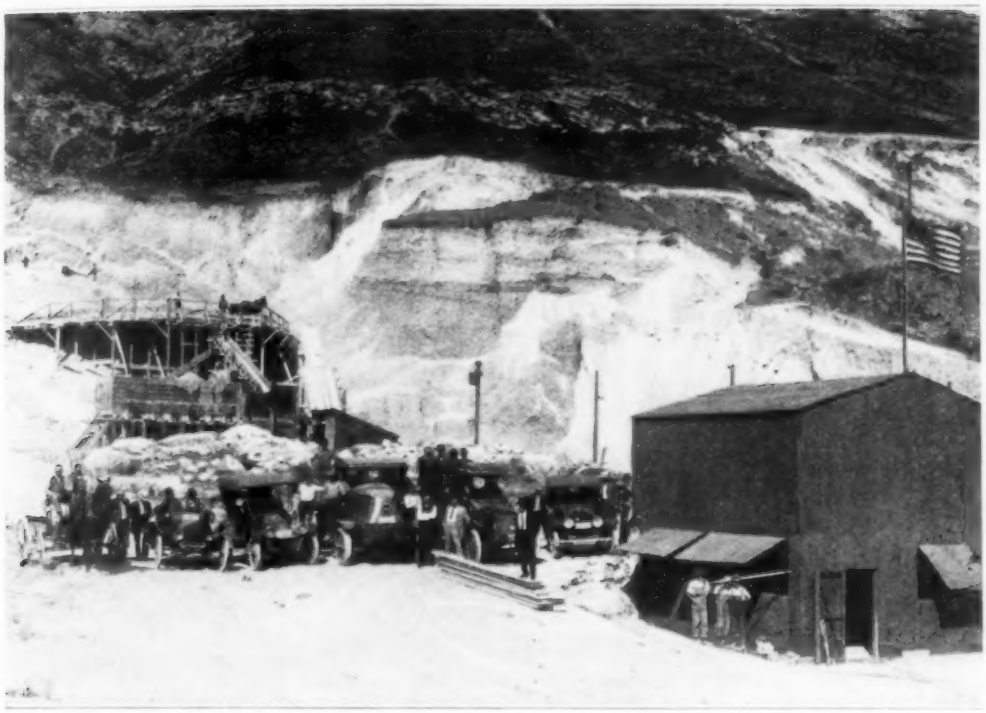
A New Type of Windmill Which the Inventor Claims Develops More Power Than One of the Fan Type

MODELS DETERMINE GRADES FOR COMPLEX CROSSINGS

In determining the smoothest surfaces for the intersections of streets converging at different grades, San Francisco engineers are employing cement-mortar models. In building one of these, pieces of cardboard are cut to scale and made to conform to the preliminary grades for curbs and street-car rails at the points of the intersection. They are then attached to a base at the proper intervals and the spaces between them filled with mortar. Subsequently a finishing layer of fine cement is applied. In shaping the surface with trowel and putty knife, preference is given to the artery carrying the greatest volume of traffic. Accurate measurements of the model are followed in executing the actual work.



Completed Model Showing Preferred Surface for a Complex Intersection of Streets That Converge at Different Grades



The Supply of Gravel in This Pit, Owned by Salt Lake City, Is Sufficient to Last for Generations. Operated in Conjunction with the Municipal Asphalt Plant, It has Enabled the City to Do Paving Repairing at a Saving of Thousands of Dollars

CITY'S ASPHALT PLANT A MONEY SAVER

A municipally operated gravel pit and an asphalt plant, erected early in 1917 at a cost of $2,100, have proven decidedly profitable undertakings for Salt Lake City. During the past year there was repaired from this plant over 10,000 sq. yd. of asphalt paving at a cost of 51 cents per square yard, which, compared with contractors' prices, meant a saving to the city of about $19,000. The same department also repaired 32,000 ft. of cracks in asphalt pavement at one-fourth what contractors asked, and did a job for the local traction company that netted a few hundred dollars. There is enough gravel in the city-owned pit to last for generations.

CA company operating restaurants in several cities reports that the saving of meat each meatless day in its establishments totals seven tons.

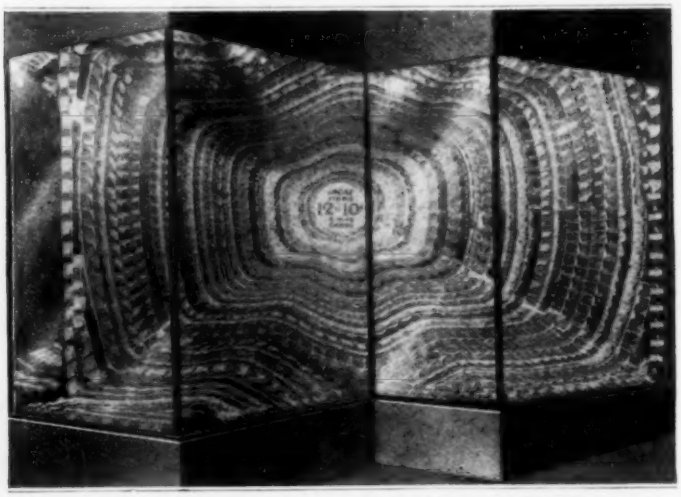
ODD ICE FORMATIONS UNDER OCEAN PIER

Strange-appearing, pyramid-shaped masses of ice, consisting of frozen salt spray, formed about the piles under the fishing pier at Asbury Park, N. J., during the exceptional cold weather of a few weeks ago. While the ice looked as though it were solid and heavy, it was really very light and porous.

Odd Ice Formations under an Ocean Pier Caused by Freezing of the Spray: The Masses Are Much Lighter Than They Appear to Be

NOVEL POST-CARD DISPLAY WINS MUCH ATTENTION

Immense advertising power was given to a post-card display in a store window not long since by the peculiar manner in which the cards were arranged. Viewed from the street, one looked into what resembled a huge basket woven of souvenir cards and turned on its side. Many persons were puzzled to know how the display was put together. The method followed was to construct a framework that conformed to the irregular shape of the window and to stretch numerous converging threads from its edges to a small disk at the rear. Beginning at the back and working forward, the decorator wove row after row of cards into the threads. There were between 800 and 1,000 views in the display and the placing of them occupied about four hours.



A Window Display Composed of Hundreds of Post Cards Woven into a Framework of Threads to Resemble a Huge Overturned Basket

BIG LOADS MADE POSSIBLE BY GOOD HIGHWAYS

The economic benefit of good roads to a community is strikingly illustrated in the accompanying photograph of a big load of baled hay being driven rapidly along a California highway. Both the truck and the trailer are piled many tiers above the driver's head. But for the fine highways this amount of hay would have to be divided into smaller loads and then probably could not be moved as rapidly as this powerful truck is now able to travel.

An Example of the Big Truck Loads Which Are Possible in Parts of California Because of Good Highways

WOULD MAKE BATTLE LINE A MEMORIAL HIGHWAY

The present western battle front, running from the North Sea coast of Belgium to the Swiss border, is to be made into a great international memorial highway, 400 miles in length, if plans which are said to have the indorsement of the governments involved, are carried out after the war. Here, about the countless graves of the men who have fallen in battle, forests will be planted, and the appalling desolation of No Man's Land will be transformed into carefully kept public grounds bordering the highway on either side. It is proposed, also, to allow many of the ruined villages to stand for a time just as they are—grim reminders to coming generations of the horrors and heroism of this war.

WORK OF SPIES SEEN IN SERIOUS JERSEY FIRE

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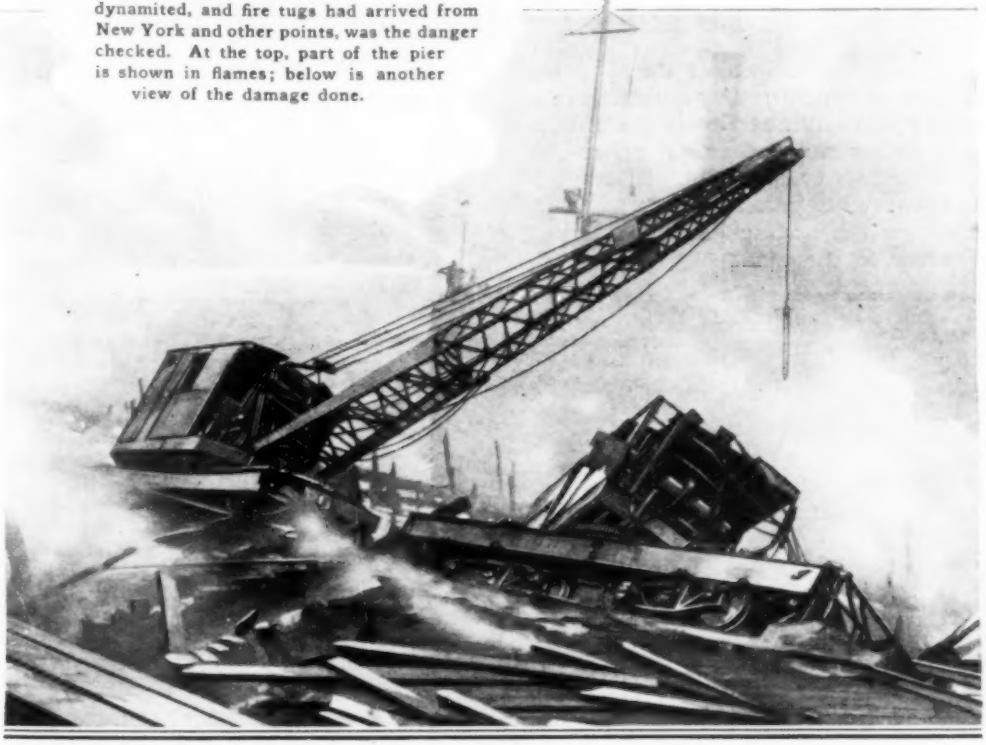
GERMAN firebrands caused the destruction of more than a mile of government pier property and seven oil barges, in addition to warehouses and railway stock in the shipyards zone on Newark Bay late in January. Only by good fortune was the loss of a large submarine plant averted. The conflagration was simultaneous with others at Buffalo and Baltimore. All followed the discovery by the Navy Intelligence Bureau of an organized plot to destroy docks and munition plants the country over. Ice floes in Newark Bay retarded fire fighters and not until much of the pier had been dynamited, and fire tugs had arrived from New York and other points, was the danger checked. At the top, part of the pier is shown in flames; below is another view of the damage done.



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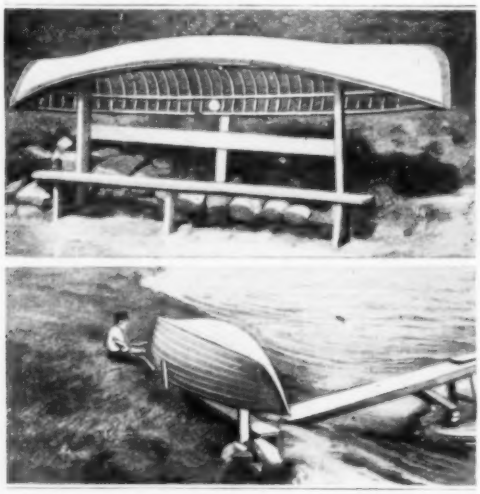
OLD ROWBOAT UTILIZED AS CANOPY FOR SEAT

The proprietor of a summer resort has put discarded rowboats to out-of-the-ordinary service by turning them upside down on supports so that they serve as shelters from the sun and rain for rustic seats. Being located near the shore, life-savers can also utilize the craft in rescue work if necessary.



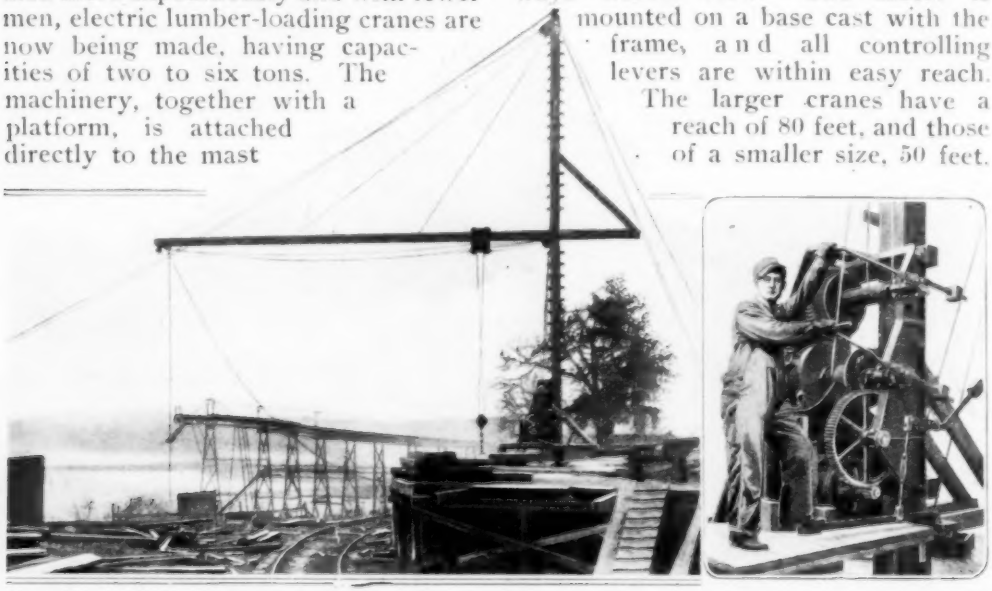
Above: An Old Boat Used as a Seat Canopy. Below: One of the Overturned Craft Located near a Bathing Beach So That It can be Used in Life-Saving, in an Emergency

PATRIOTIC WORKMEN BUILD PIERS IN RECORD TIME

Inspired by a desire to render a patriotic service in a serious emergency, contractors and workmen made an unusual record not long ago by completing in 77 days two Baltimore and Ohio Railway piers at Baltimore, that were burned by pro-German sympathizers. Precedents were set aside and work was begun before any drawings were made, the contracts being let the day after the fire, and the work of clearing away the vast amount of débris beginning the second day. While this was in progress rough plans were made, which proved adequate. The 700 workmen employed developed a keen rivalry in speeding up the work.

ELECTRIC LUMBER LOADER SAVES MAN POWER

In order that lumber may be handled more expeditiously and with fewer men, electric lumber-loading cranes are now being made, having capacities of two to six tons. The machinery, together with a platform, is attached directly to the mast so that the operator has the load always within view. The motor is mounted on a base cast with the frame, and all controlling levers are within easy reach. The larger cranes have a reach of 80 feet, and those of a smaller size, 50 feet.



An Electric Lumber Loader Which Is a Great Labor Saver: The View at the Right Shows the Machinery and Operating Platform Attached to the Mast So That They Both Turn with It

CLAIM HEIGHT OF CHAIRS IMPAIRS EFFICIENCY

The criticism which has been made in recent years regarding the too great height of school seats also applies to the chairs in the home and office, according to persons who have been giving the matter careful study and who have made practical tests along this line. The average office or home chair, it is claimed, is so high that when occupied by a person of medium stature, or less, the front edge of the seat presses against the limbs, causing more or less pronounced congestion of the blood and nervous irritation, with a corresponding loss of efficiency. One person interested in this question shortened the legs of a number of chairs in his home and declared that the increased comfort of the family completely justified the rather drastic measure. When one is seated and the feet are flat on the floor the chair should be sufficiently low, it is said, to lift the limbs above the front edge of the chair enough to permit the open hand to be inserted between either limb and the chair seat.

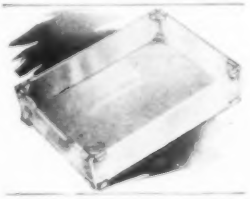
Top View: Hanging a Swing to Its Support by Means of Links That Open Like Scissors. Lower View: One of Several Merry-Go-Rounds Which Hard Usage in the Playgrounds of Denver, Colorado, has Shown to be Very Durable. This Outfit has been Partly Dismantled

DURABLE MERRY-GO-ROUND FOR PLAYGROUNDS

A type of merry-go-round which experience in Denver, Colo., has proved very durable is made of iron piping and castings, except the platform, which is of wood. It is wheel-shaped with ball bearings, and supports extending from the central post to the circumference. A crank rod, connected with gearing in the hub, is provided by which one child can make the wheel revolve. In the playgrounds of the same city a scissorslike link having an eye at either end is used to connect swing chains to their supports. The link is halved lengthwise, with overlapping ends, the two parts being pivoted together so that they can be spread apart to receive adjoining links or eyes.

OFFICE LETTER TRAY OF PLATE GLASS

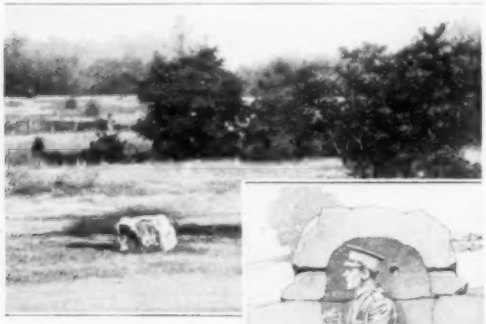
A novel and ornamental fixture for an office desk is a plate-glass letter tray similar in shape to wooden trays. The sides and bottom are held together by nickel-plated clamps, and the exposed edges of the glass are ground round and polished. Rubber feet protect the furniture on which it rests.



¶An apparatus has been patented which aids in peeling tomatoes rapidly by puncturing their skins at many points by means of electric sparks.

IN FRANCE THE VERY STONES HAVE EYES, SOLDIERS FIND

Even weather-worn rocks are looked upon with suspicion by soldiers in France. Distrust is not uncalled for either, for, as it happens, a rock ever so friendly in appearance may not be a rock at all. Often a plaster one with conveniently located peepholes conceals a pit in which an observer is stationed.



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The Rock Shown Above Conceals a Pit

The Pit Concealed by the Rock Holds an Observer

COLD AND TIDE WRECK MILE-LONG BRIDGE

The mile-long wooden toll bridge that spans Hampton River in New Hampshire, near its mouth, was completely swept away a few weeks ago due to an unusual combination of adverse conditions. A cold wave of almost unprecedented severity froze the river over, after which an exceptionally high tide swelled the bed of ice, wrenching the wooden structure from its moorings and causing a loss of $42,000. The wreckage was carried down toward the sea.

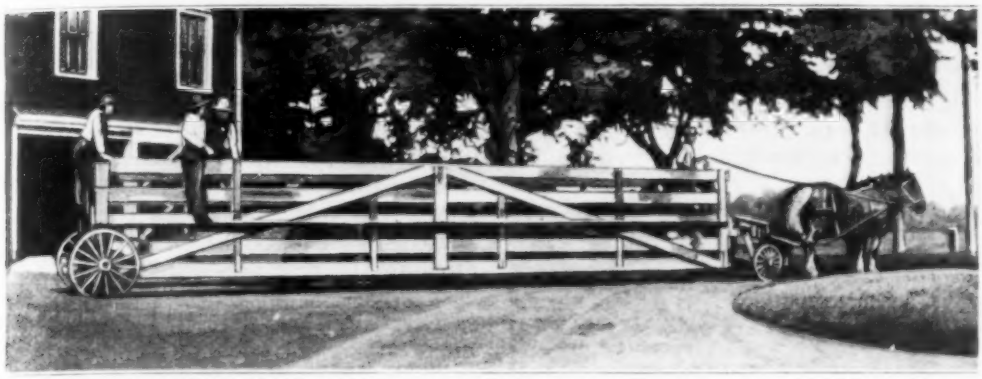
Remains of a Wooden Bridge a Mile in Length Spanning the Hampton River

ONE AND HALF HORSEPOWER DEVELOPED BY STRONG MAN

Interesting attempts have been made to determine the maximum external power capable of development by men of good physical endowment. Tests have been made by racing strong youths up flights of stairs. Their weights, the heights ascended, and the seconds spent in the ascents have been measured. From these figures the amount of work accomplished has been computed. One fellow, the best athlete in the group, weighed 168.3 lb. at the time of a recent experiment. In six seconds, from a standing start, he raised himself to a height of 28.96 ft. His average power was thus 812.33 lb.-ft. a second, or the equivalent of 1.5 hp. This result was attained without special training. Experiments have been made in different places and it has been found that the inclination of a stairway, within the limits of 27.4° and 37.4°, has no appreciable effect on the results. Up to 13.12 ft. the generation of energy accelerates rapidly, but after that point the increase is not so great. The greatest efficiency is obtained on a course reaching to a height of about 29 ft. The effect of fatigue is noticeable when greater heights are attempted.

UP-TO-DATE FARMER MOVES CATTLE IN NOVEL RACK

A portable floorless rack, or crate, 10 ft. wide and 30 ft. long, is the novel and very serviceable device employed on an up-to-date farm in transporting small herds of live stock on the public highway. The outfit is about six feet high and is supported a few inches above the ground by running gear, a



COURTESY OF EARLE BROWN

A Team of Horses Transporting Cattle in a Floorless Rack as Easily as It would Draw an Empty Wagon. Twenty Head of Cattle can be Handled with This Rack, Which is Provided with a Running Board for Helpers

pair of wheels being located at each end. It is especially useful in handling calves or cattle that are wild, the animals being driven into the framework, which is then closed and drawn along by a team. The outfit eliminates all danger of the herd being scattered or stampeded. A running board is provided on either side, on which helpers stand and oversee the animals. With as many as 20 head of cattle in the device, it can be drawn along as easily as an empty wagon.

NEW PIPE ORGAN TO BE LARGEST IN WORLD

Arrangements have recently been completed for the erection of a pipe organ in a Philadelphia auditorium which the makers claim, without contradiction, will be the largest pipe organ in the world. There will be many distinctive features about the great instrument, which will consist of three divisions: the main, a dome, and a gallery organ. The first will occupy the rear of the stage, and in place of the usual case its pipes will be arranged in nine beautiful panels 10 ft. wide and separated by marble columns. The other two divisions will be invisible. All told, there will be 283 speaking stops. According to the plans, the three organs may be played together or separately from one four-manual console. It is said that no other organ places an equal number of stops, pistons, and pedals under the control of one performer.

SPECIAL BOXES RECEIVE MAGAZINES FOR CAMPS

As an aid in supplying the 40,000 soldiers at Camp Lewis and the sailors at the Puget Sound Navy Yard with an ample amount of reading matter, the Seattle Chamber of Commerce and Commercial Club recently placed 260 large boxes, painted red, white, and blue, on street corners in that city to receive gifts of new or used magazines. Many of the boxes are filled daily. The

Dropping Magazines for the Country's Fighting Men in One of Seattle's 260 Boxes, Installed on Street Corners for This Purpose

literature is distributed through the Y. M. C. A., the surplus being sent to France.

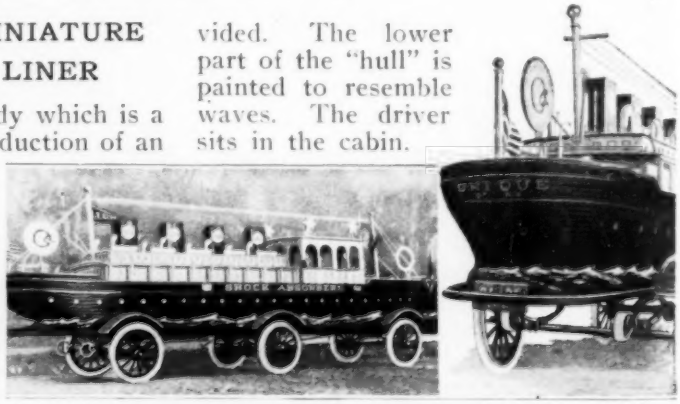
TO ENTERTAIN OUR WOUNDED WITH MUSIC BY WIRELESS

Through wireless transmission of music the tedium of long hours of idleness is to be broken for wounded soldiers at an American base hospital abroad. A radio-phonographic apparatus will be employed. It is a device of recent evolution that permits the dissemination of music from a central place to numerous points. In use, it will enable convalescents who cannot be moved from their cots in crowded wards to be entertained without disturbing the rest and peace of mind of less improved patients near them. It is particularly this feature that seems meritorious. The system is essentially the application of wireless telephony. The transmitting outfit, which is linked with a phonograph, is operated in a soundproof room. The music sent out by it is picked up by portable receiving sets supplied to the soldiers. Connections are made between the latter devices and the metal springs of the men's cots, which serve as aerials. The music is heard through delicate telephone receivers. A complete outfit with 50 receiving sets has been sent overseas to one of our hospitals and is possibly in use by this time.

By Means of Radio-Phonographic Apparatus of This Type, Convalescent Patients in Crowded Hospital Wards may Listen to a Musical Program without Disturbing Their Less Improved Comrades in Adjacent Cots. A Complete Outfit has been Sent to One of Our Hospitals Abroad

AUTO BODY IS MINIATURE OF AN OCEAN LINER

A 30-ft. automobile body which is a remarkably faithful reproduction of an ocean liner, has been used by an eastern dealer for display purposes. It is mounted on a six-wheel chassis, and such details as life preservers, lifeboats, a wireless outfit, portholes, ventilators, hoisting tackle, etc., have all been carefully provided. The lower part of the "hull" is painted to resemble waves. The driver sits in the cabin.



Side and Rear Views of a Remarkably Faithful Reproduction of an Ocean Liner That Serves as a Body for a Six-Wheel Chassis: The Body Is 30 Feet Long, and the Driver Occupies the Cabin near the Bow

GERMANS PLAN TO CONTROL RUSSIAN TRADE

By F. H. WILLIAMS

Trade-Mark Specialist

THE German people of the manufacturing class, we may well believe, realize that Germany will never achieve its war program. At the same time they are well aware of the prejudice in this country, as well as among the allies, which may amount to boycott on their goods after the war. Already far-reaching plans are being made by producers of the enemy country to overcome these obstacles.

Just as they have disposed of goods under a "Made in Switzerland" label, so they have been preparing for a long time to put forth a new slogan, "Made in Russia." More than this, they have been planning, in a way so comprehensive that American interests should be deeply concerned, to capture the trade of Russia, the volume of which is enormous.

In many respects German commercial methods are more successful than ours. The Germans have derived great advantage in the past by extending long credits and doubtless they will again. Is it not strange that, regardless of the special efforts we make to win foreign trade, the American idea is against credits? And this has become more pronounced since the war began. Already Germany is doing business in Russia by parcel post through Sweden and other neutral countries, being ready to wait for a settlement of accounts until after the war. There are also many Swiss and Danish commercial travelers attending the fairs and taking orders for German concerns to be filled as soon as peace is declared.

These fairs are one of the principal channels through which business is secured. Americans have little conception of their importance. The turnover of 16,000 fairs held in Russia in 1915 was over $500,000,000. The fair at Irbit did $4,000,000 worth of business last year, and before the war, in 1913, its total was three times that. The Kiev contract fair is also famous, and during February, the fair month, the city is crowded with bankers, manufacturers and agriculturists. Sugar, machinery imported from Denmark, Norway, and Switzerland, and chemicals, likewise imported from various neutral countries, were among the commodities dealt in.

The following is a list of the Russian fairs, in addition to Kiev, doing $1,000,000 worth of business and over:

Nizhni Novgorod (an article in the March issue told of the volume of business at this fair);
Village of Krivoroshskaya, $1,250,000, cattle, corn, wine from home vineyards, raw materials, factory and imported goods;
Town of Kosmodemiansk, $1,000,000, timber;
Temirskaya, Temir (May 20 to June 20), $1,125,000, cattle and animal products, manufactured goods;
Irbitskaya, Irbit (Jan. 25 to March 1), $12,000,000, manufactured and cotton goods;
Sbornaya, Simbirsk (first to third week in Lent), $2,000,000, manufactured goods, leather, wool, cattle;
Menselinskaya, Menselinsk (Dec. 26 to Jan. 11), $1,500,000, manufactured goods, cloths, cotton, groceries, tea, indigo, leather, furs, fish, cattle;
Kreschchenskaya, Kharkov (Jan. 6 to Feb. 1), $7,500,000, manufactured goods, groceries, peltry, metal goods, leather;
Pokrovskaya, Kharkov (Oct. 1 to Oct. 26), $6,250,000, manufactured and imported goods, groceries, leather;
Ouspenskaya, Kharkov (June 1 to June 20), $4,250,000, manufactured goods;
Kouyandinsko-Botovskaya, Kouyadinskai, Karkaralinsky district (June 1 to July 1), $1,125,000, manufactured goods.

One other factor, Russia's characteristic national industries and handicrafts, is being taken into consideration by German commercial interests and must be thoroughly studied by us if we really are to develop trade in this vast territory. Take the making of wooden spoons as an example of the way peasant industry is organized. Four operations, each done in a separate village, are required to make these articles. These are, obtaining the wooden dummy, cutting the spoon in the rough, shaping it, and painting and varnishing it.

Scores of similar cases might be cited, such as wheel making, shoemaking, basket weaving; the preparation of tar and resin; carpet weaving, lace making; the manufacture of shawls and scarfs; string making and the knitting of fish nets; the manufacture of knives of various sorts, of horn articles, brushes, toys, and so forth.

Even now Germany is quietly planning, by immigration, investing capi-

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tal, and by extending long credits, to dominate the Russian field after the war, dealing directly from producer to retailer. This is, indeed, an important step in attaining a commercial development that will enable Germany to control an even greater field, namely, China and other parts of the Far East.

FLOODS DAMAGE RAILROADS IN STATE OF WASHINGTON

Heavy winter rains in the Pacific northwest country turned rivers into raging torrents that swept away

Flood-Wrecked Railway Bridge over Yakima River in Washington: After the Picture was Taken More than 100 Yards of the Embankment Visible in the Foreground was Washed Away

bridges and did considerable damage to other property. The steel structure of the Chicago, Milwaukee, and St. Paul Railway across the Yakima River near Ellensburg, Wash., was washed out and a long stretch of the approach track destroyed. Service was maintained between Seattle and Spokane by operating stub trains between the former city and Thorp and from the latter station to Ellensburg, the passengers being transferred between the two river points by motor car.

OIL PROSPECT ENCOURAGING IN GREAT PLAINS AREA

All available data concerning the structure of the Great Plains region are presented in a report issued by the Geological Survey in recognition of the current widespread interest in oil prospects. Conditions, it is asserted, are favorable for exploratory drilling, although up to the present time neither oil nor gas has been struck in the greater part of the vast area. Encouragement arises from the fact that the district contains several arched strata and domes similar to the oil and gas-bearing ones in central Kansas, Oklahoma, and Colorado. The location and extent of a number of the most promising of these north of latitude 37° have been indicated on a map prepared after a thorough investigation of the territory. Attention, for instance, is called to a dome northeast of Chadron, Neb., on the line separating that state and South Dakota. It is possible that this extends southward and joins a stratum that crosses into Norton County, Kansas.

HOUSE FOR INCUBATORS WITHSTANDS COLD

For the purpose of housing eight 400-egg incubators, a Wisconsin poultry man has erected a thoroughly fireproof structure of concrete, measuring 16 by 26 ft., and having a rounded-arch roof. The floor is 5 ft. below ground level and the side walls are 8 ft. high. Air spaces in the walls and ceiling make the structure quite impervious to heat and cold, a uniform temperature being

Fireproof Structure So Well Constructed That the Lamps of the Incubators Which It Houses Are Sufficient to Heat It in Cold Weather

maintained within by using only the incubator lamps.

At the Left a Lock Tender on the Chesapeake and Ohio Canal is Removing the Eels Caught during the Night. The Picture at the Right Gives a View of One of the Spillway Traps

EEL FISHING, A CANAL INDUSTRY

By SAM E. CONNER

EEL fishing, as conducted along the Chesapeake and Ohio Canal by the lock tenders, is an industry of importance and a factor in the food problem of the nation today. The lock tenders use a different type of trap—for they do not depend upon hook and line—from those ordinarily employed by eel fishermen. The usual trap is made of a box, or barrel, so arranged that once the fish gets in, it can't get out—but it doesn't have to go in unless the bait appeals. Here is where the canal fishers "have it on" their brethren. Their traps are so constructed that once an eel gets into the waters of the spillway nothing can keep him out of the trap.

The spillway itself, around each set of locks, is one of the main parts of the trap. In it, just beyond the point where it leaves the canal, the tenders construct a box, which fills the entire width of the way—usually about five feet. The box has a bottom of wooden slats, permitting the water to pass freely, but effectually preventing an eel from slipping through. The bottom rises at an angle of about 30°, the upper, or downstream, end being directly over a large box of the same construction, which constitutes the final trap. Fish getting into the rushing water of the spillway are carried irresistibly along, up the slanting bottom, and then drop into the last-mentioned box, from which they are taken, packed in barrels, and shipped to market.

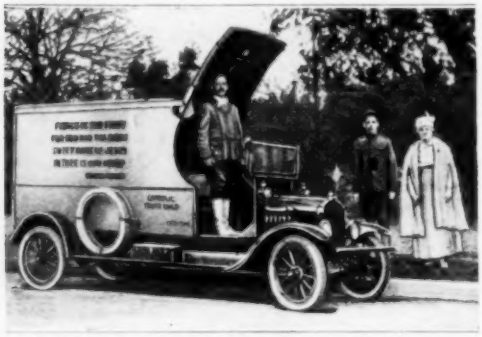
The fishing season begins about the first of September and lasts until ice forms. The fish run at night and the catch ranges from 30 lb. to 200 lb. a night. The eels bring about 10 cents a pound, so that even a 30-lb. catch per night means a considerable addition to the regular earnings of the tenders. One of them got $54 for his first week's catch last year.

Most of the eels taken on this canal go to the Washington, Philadelphia, and Hagerstown, Md., markets. Of these, Philadelphia is considered the best. The fish are used fresh, or smoked and pickled for later use. The demand is large.

SPECIAL AUTO TRUCK USED IN RELIGIOUS CAMPAIGN

An auto truck of special design, equipped for a religious campaign by a Catholic guild, is now touring the country. The canopy over the driver's seat is hinged so that it can be turned upward, permitting a person to stand upright beneath it. When the car is used as a rostrum this canopy,

to which a crucifix is fastened, serves as a sounding board. Mottoes adorn the outside of the car, while the interior is equipped with shelves to hold literature.



Auto Truck Built to Serve as a Portable Rostrum in a Religious Campaign: The Upturned Canopy Acts as a Sounding Board

AUTOMATIC GAS VALVE ACTS WHEN PRESSURE FALLS

To protect users of natural and artificial gas from the dangers that obtain when the pressure falls without warning, an automatic shut-off valve has been designed. Its function is to stop the flow to burners whenever the pressure becomes too weak to support combustion safely. In passing through the device, the gas is made to raise a plunger that is an ounce less in weight than the minimum pressure required for maintaining a fire or light. When the flow is unable to support the load, the plunger drops and locks. Gas cannot then reach the burners until the proper pressure returns and the valve is reset by hand.

¶Certain military airmen in Europe have been greatly aided in their fighting by equipping their machines with steel mirrors, such as are used on motorcycles to give the rider a view of the road at the rear.

AMERICANS TO HELP BUILD MODEL ROAD IN CHINA

Arrangements have been completed for the construction, with the financial and technical assistance of Americans, of a model highway from Peking to the important provincial town of Tungchow, 15 miles to the east of the Chinese capital. The project has been discussed for some time, and one incentive for undertaking it now is that it will afford sorely needed employment for many Chinese made destitute by serious floods last fall. The American Red Cross has deposited $100,000 in a Peking bank to help cover the cost of the work and the Chinese government is relied on for an equal amount. While a Chinese director and chief engineer will be in charge of the work, close attention will be given to the project by an American engineer. When additional funds are available it is proposed to extend this road to Tientsin.

TEMPORARY ARMY OFFICE IN SIDETRACKED CARS

There being no adequate building near an army camp's railway station where troops were to detrain, the officer in charge of detraining requested the railroad to place a caboose and passenger coach on a spur near the depot, for his use. These served as a very satisfactory office, a telephone having been installed and calcium lights set up above a temporary sheltered platform that gave easy access to the caboose.

Coach and Caboose, Approached by a Temporary Platform, That Served as Headquarters for an Officer in Charge of Detraining at an Army Camp

SMOKESTACK BLOWN OVER DURING WINDSTORM

Looking Up and Down from the Third Floor, Showing the Destructive Effect of the Falling Chimney

View Showing Great Hole Torn in Roof of Building

The First Floor, Where Several Workers were Buried beneath the Avalanche of Débris

During a heavy gale that swept Lynn, Mass., recently, a tall brick smokestack collapsed and crashed through a three-story building occupied by a box factory, in which 200 persons were employed. A large rectangular hole was torn in the roof and the two upper floors at one corner of the structure. The accident occurred without warning, and several of the workers were caught in the avalanche of débris and crushed beneath its great weight.

PASSPORTS OF NEW DESIGN FOR AMERICANS

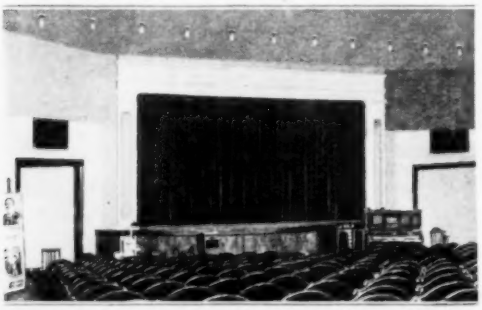
Persons leaving the United States for Europe or Asia are now required to take out passports of a new design, the old ones having been superseded except for traveling in the western continent. The new document is about half the size of the old one and has a blue-gray cast by reason of a background made up of innumerable repetitions of the words "United States passport," in letters of microscopic size. Within the cover the sentence "This document is an American passport" is printed in 17 languages.

MOVIES IN RURAL SCHOOL MAKE A REAL HIT

Phenomenal success has marked the movies for farmers which were instituted a few months ago in the Mingo, Ohio, centralized rural school, under high-school auspices. Every Friday night the assembly room of this mod-

The Mingo, Ohio, Centralized Rural School Where Motion-Picture Shows are Held: The Undertaking has Proven So Successful That Three Other Schools in the County Now Have Movies

ernized successor to the "little red schoolhouse" is filled with people from miles around and from the village, whose population is 150. This experi-

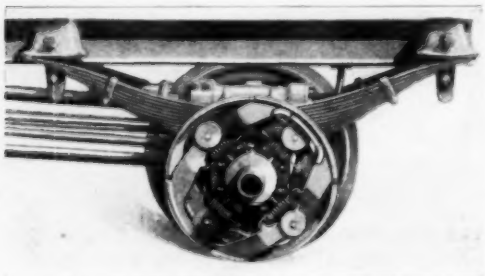


Assembly Room in Centralized Rural School Where Movies are Presented Weekly to Crowded Houses

ment in providing attractions to counteract the cities' lure was undertaken with some feeling of uncertainty, for the entire motion-picture equipment, a secondhand outfit costing $110, was purchased on borrowed money. The films are obtained from regular movie concerns and are high-grade but not "high-brow." They have been so popular that the venture nets an average of $40 per week. With the funds secured, a second projector has been added to the booth and a piano player purchased, as well as other equipment for the school. The motion-picture outfit is also being used to good advantage in the classrooms.

SELF-ADJUSTING SPRINGS USED ON MOTOR TRUCK

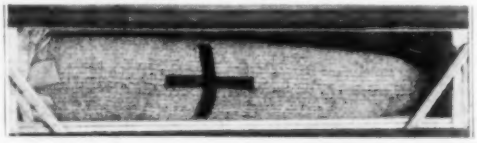
One of the interesting developments in spring suspension for motor trucks is a plan that eliminates the shackles. The springs float under heavy blocks attached to the frame. By this arrangement the weight is imposed on the flexible tips of the springs only when the machine is empty, or nearly so. As the body is loaded the springs flatten, the ends extending beyond the blocks so that the active part is shorter and stronger than at periods of less stress.



The Springs Float under Heavy Blocks So That They Flatten as the Load is Increased

FIFTY-DOLLAR EAR OF CORN THIRTY-TWO INCHES LONG

It is exceedingly rare that one finds an ear of corn 7 in. in diameter and 32 in. long. Such a specimen recently netted the Red Cross $50 when raffled. It may not be irrelevant to mention,



A Pine Stick Serves as a Cob for This High-Priced Ear of Corn

however, that the kernels were attached to a pine stick, instead of a cob, and that the work was done by a gentleman from Indiana.

ARCS OPEN BLAST-FURNACE TAP HOLES

An electric arc is being employed in Europe to open tap holes of blast furnaces, according to reports. The arc is made to extend from an electrode to the cooled metal closing the passage, melting away the barrier as far as the liquid metal within. If matter is encountered which is a nonconductor, a bar is driven into it and the arc permitted to follow the bar, thus continuing the melting of the cooled metal.

An illustration of the tremendous rise in the price of ships is found in the recent experience of a Swedish shipowner. He was offered a certain vessel for $105,000 and, on investigation, learned that it was the same craft that he had sold in March, 1914, for $7,200, approximately.

Intimate Glimpses of Wallace, Idaho

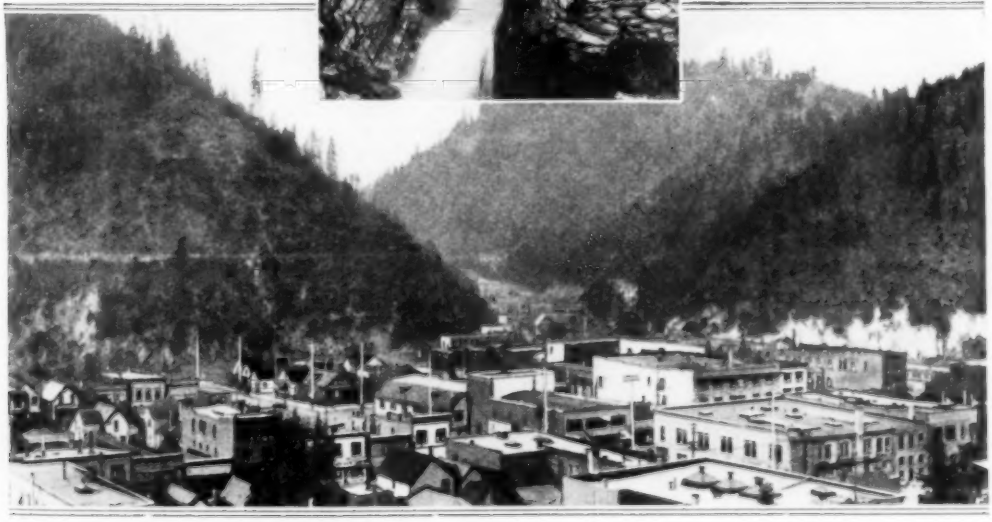
By Our Traveling Editor

Most of Wallace's Mines Are in Cañons Adjoining the City. A Little Gold and Considerable Silver Are Mined with the Lead

There Is an Abundance of Water Power in the Vicinity. This Torrent Furnishes Power to the City and to Several Mines

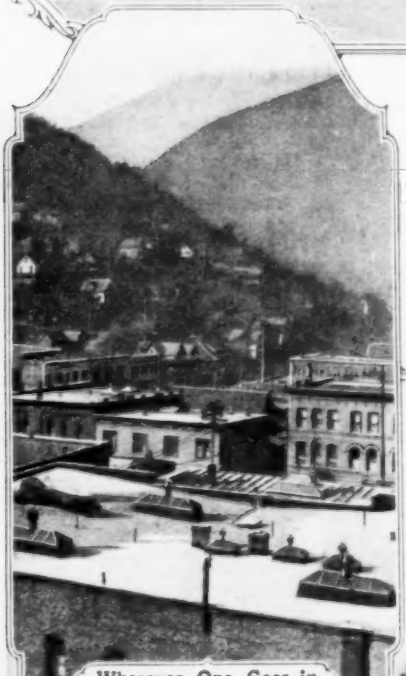
WALLACE, although perched like an eagle's nest high up in the precipitous Coeur d'Alenes, is today one of the busiest cities in the present activity of the world. This is because the town is one of the great lead-producing centers of the world and is mining approximately a million pounds a day of this metal which is going into bullets, shrapnel, and other missiles to be hurled at the kaiser. In fact without the lead mines there would be no Wallace, Idaho.

It is a typical mining town—dingy, dirty, and tumble-down in appearance, and with that characteristic roughness that is invariably present in such communities. As one stands on any street in Wallace he has only to look over the top of any building upon hills which seem to tower into the very heavens. There is nothing beautiful nor



The City Is a Cluster of Buildings Nestled among Great Fire-Denuded Hills. The Hills Are Green Only in the Few Places Where the Forest has Begun to Grow Again

The Great Lead-Mining Center Is Also the County Seat of Shoshone County, and Its Courthouse Is the Most Pretentious Bit of Architecture in the Community



Wherever One Goes in Wallace He Gets Another View of the Rugged Coeur d'Alenes, and a Little Climbing Gives a Bird's-Eye View of the Town

The Residence Section of Cedar Street Is a Commendable Example of Good Living Conditions Created amidst Unfavorable Surroundings. The Church Is the Wallace Episcopal Edifice

There Are Several Down-Town Buildings That Present a Striking Contrast to the Tourist, Compared with the Ramshackle Mining Structures. The Shoshone Office Building Is One of Them

There Is Plenty of Wood in Shoshone County and, as a Result, the Retaining Walls between the Various Hillside Levels of Wallace are Built of Logs

When the Town Outgrew the Valley, Homes Were Built on the Hills. These are Reached by Stairways and Wooden Inclines

During the Daytime the Down-Town Streets are Practically Deserted, Most of the Population Being at the Mines. This View Is Part of Cedar Street

inviting about these hills, for they have all been denuded by forest fires. They are charred, brown, and barren, and are generally shrouded in a haze of smoke.

Money is the only thing in Wallace that is considered seriously. The miners get big wages, and more miners are wanted every day. The mine owners have amassed large fortunes almost overnight, or more rightly since the unparalleled demand for lead because of the war. The merchants of the town are there because they see opportunity of selling clothing, food, and other articles to the miners at exorbitant prices. The gamblers are there too, as are also a surplus population of miscellaneous freebooters.

The lead that is being mined also contains no small amount of silver, and a little gold, and I am told that the market value of these latter metals more than pays for all the mining operations. The lead therefore represents net profit to the mine owners and corporations controlling it.

As is usual with a mining town, there is little of permanence in Wallace. This is due to the fact that no one knows "how long the boom will last." Miners do not build permanent homes when they don't know from one week to the next whether they will be there or not. Merchants do not establish themselves in permanent or costly headquarters. In fact, very little is done, either in the way of building or in the nature of municipal improvement, with the idea of making it last indefinitely. "It's good enough for the present," might be well adopted as the town's slogan, for it fittingly characterizes the attitude of the people.

Some of the mines in and near Wallace are operated by hydroelectric power, but many of them depend upon steam, which is derived from wood as fuel. Wood is, of course, the only domestic fuel. Statewide prohibition, schools, and churches have mitigated a multitude of former evils.

DOGS' BOARDING SCHOOL HAS STIFF COURSES

An Automobile Equipped with a Special Cage at the Rear for Carrying Dogs to and from the School or Hospital

Interior View, Showing the Individual Pens on the Left, the Laboratory at the Far End, and the Kitchen on the Right

PHOTOS COPYRIGHT, RICHARD GOODWIN

This Dog has been Trained to Go through Streets and Stores Costumed and Carrying Advertisements

The education and care of dogs has been reduced to a science in a western institution where animals from various households are given courses of instruction which range from the common amenities expected of a well-behaved canine, to taking part in an advertising campaign. Among the simpler things which the "pupils" learn are to refrain from jumping up on visitors, to bark only in case of danger, and to sit in a corner until called. A cook is employed to prepare the food, which consists principally of corn bread for breakfast and vegetable soup at night, each dog eating and drinking from his own dish. No meat is provided. Individual, electrically lighted pens are used, in each of which is a carpet bed that is disinfected each morning. A daily examination by a veterinarian reveals any cases of illness and these are quarantined or sent to a hospital connected with the institution.

The school specializes in teaching dogs tricks, such as counting by barking, and picking out any color designated by a word of command. One of the best-known of the "graduates" has

GOOD ROADS
MOTOR TRUCKS Will Help TO WIN
CONCRETE SHIPS THE WAR
CHICAGO TO THE NATIONAL MOTOR BOAT SHOW JAN. 19 - 26 GRAND CENTRAL PALACE NEW YORK

Concrete Motorboat About to Start on an Overland Trip from Chicago to New York Which, Because of the Cold and Snow, Consumed Over Three Weeks

been trained to carry advertisements through the streets of the city, to assume clever poses for photographs, and to exhibit himself in store windows.

TEST SHOWS SOUNDNESS OF THRESHED GRAIN

A simple method of ascertaining whether small grain has been injured by threshing has been found by a Swedish agricultural expert who studied the question with special reference to the preparation of grain for seed. His method is to immerse kernels in a .4-per-cent solution of eosin, a dyestuff much used as a stain in microscopic work, and then wash them in water. Only the fissures in the kernels will absorb the red stain so that the extent of any injuries can be readily detected. A system of rating by fractional marks is employed to indicate the condition of kernels, 0 denoting a perfect specimen; ¼, one having a broken end, and so on.

CONCRETE BOAT JOURNEYS OVERLAND IN BLIZZARD

The 18½-ft. concrete motorboat, presented to the United States Naval Reserve a few months ago and described in Popular Mechanics Magazine, recently completed a trip perhaps unequaled by any other motor craft. The boat was loaded onto a truck in Chicago and started overland for the New York motorboat show. Terrific blizzards caused much hardship and delay en route, the drivers frequently being compelled to shovel through deep drifts. Finally an axle broke, and the congested railways being unable to accept the craft for shipment the rest of the way, the men had to await the arrival of new parts.

MOTORCYCLE-DRIVEN SLED MAKES GOOD SPEED

Exhilarating winter sport was made possible by mounting a 4-hp. motorcycle behind a long sled, a wood and steel support bolted to the latter being provided to hold the forks of the motorcycle from which the front wheel had been removed. One person, seated backward at the rear, controlled the spark, gasoline, and clutch. The rear wheel was wound with rope to prevent slipping. On hard snow a speed of 30 miles an hour was obtained.

Sled Driven by a Four-Horsepower, One-Cylinder Motorcycle, the Front Forks being Attached to Uprights Bolted to the Sled

TOWER ON FARM IS SHOP, BEDROOM, AND LOOKOUT

Advantageously located on a 1,000-acre farm in Indiana, is a frame tower, 40-ft. high, which is of interest because it is utilized in so many ways. The upper part of the structure is occupied by a 4,000-gal. tank made of concrete staves. From the platform surrounding the reservoir the owner can observe work going on in any part of the farm. The first floor is equipped with a pump, a motor with which water is raised to the tank, a workbench, drill press, lathe, and blacksmith shop. The second floor serves as a bedroom for a helper, and here seed corn, harness, and extra blankets are stored.

SOLDIER DIGGERS UTILIZE BELTS AS TAPELINES

Accurate measurement of the depth of trenches dug by men under the command of an officer at one of the training camps is made possible by using the soldiers' belts as tapelines. For this purpose each belt is marked off on the inside in 6-in. spacings.

The big demand for explosives in which celluloid is used has so seriously affected the supply of this material for the making of motion-picture films that old and scrap films are being gathered up and the celluloid in them used over again.

MAY MAKE FISHING BANKS OFF LONG ISLAND

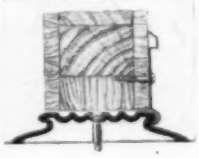
Following certain experiments of an anglers' organization, the Bureau of Fisheries is considering the creation of artificial fishing banks off the coast of Long Island. It is proposed to dump the material obtained in digging the New York subways in this region, forming a stratum of rock and gravel one or two feet thick, on which, it is thought, marine growths would thrive. These would give shelter to various forms of lower life on which fishes feed, and so the latter would be attracted to the region in large numbers.

HALF-SLATE TAG FOR USE IN STOCK ROOMS

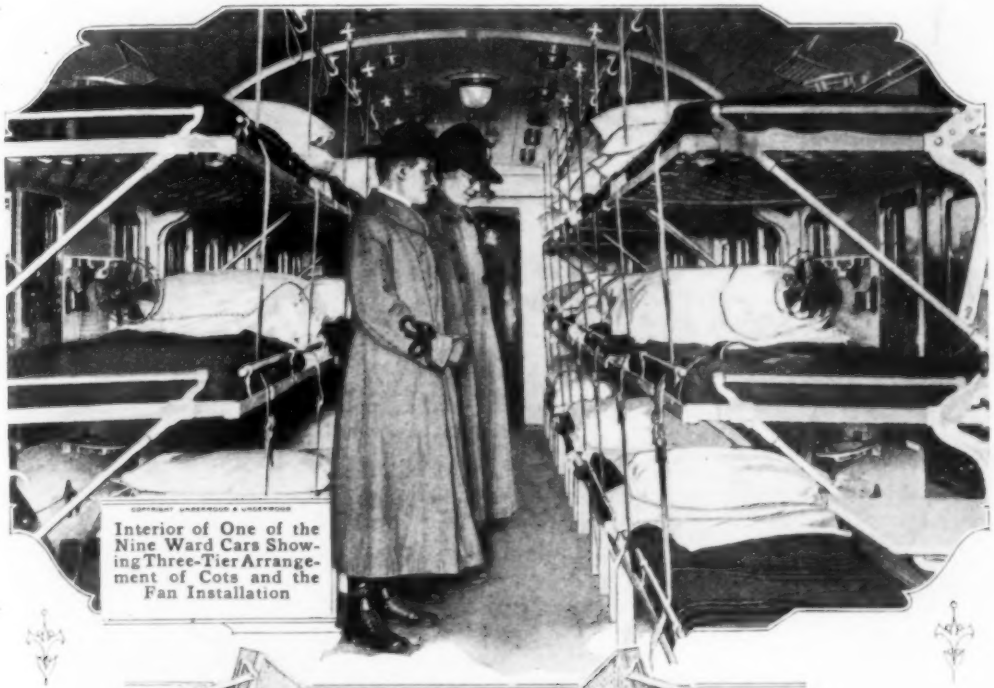
Greater efficiency in checking up materials in a stock room is made possible by attaching to the containers an improved stock card, the upper half of which is light colored, while the lower half has a slate coating. The names of the articles in the containers, their sizes, etc., may be written on the upper part, while the changing quantity number is marked in chalk below, thus serving as a perpetual inventory.

INTERLOCKED DOOR PLATES EXCLUDE DRAFT AND DUST

Corrugated-metal plates with edges that interlock are fitted to door bases and thresholds to keep out all weather and dust. A small projection near the top of the door-base member diverts rain and thus reduces the possibility of its running under the door. With the door either open or closed the fitment is so inconspicuous as to be seldom noticed.



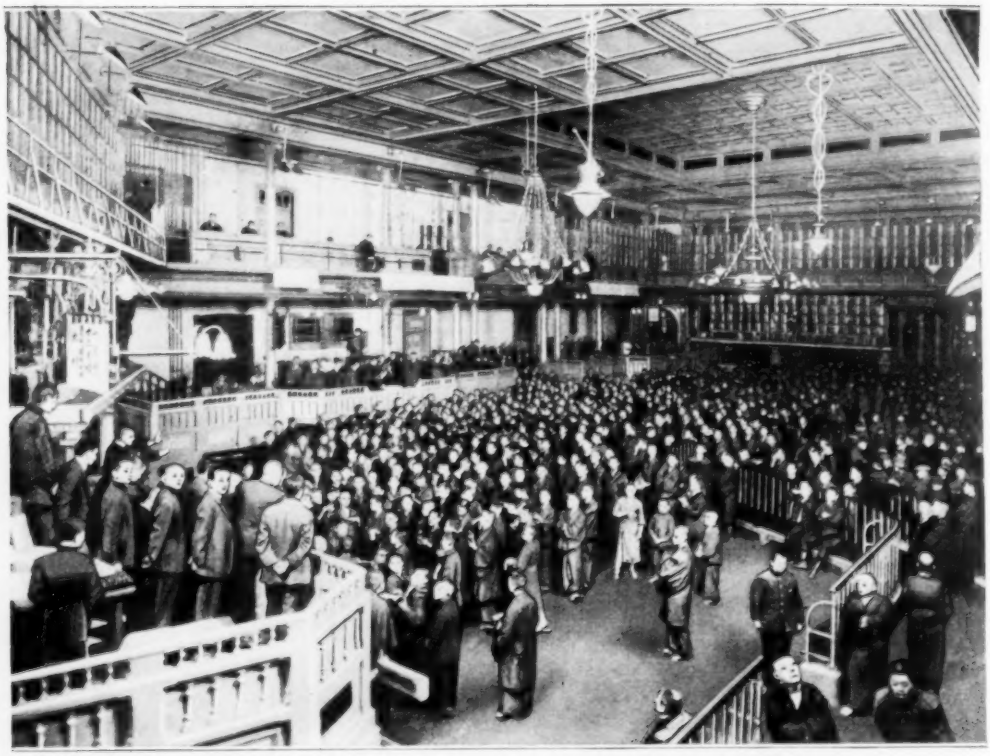
REMARKABLE RED CROSS TRAIN FOR OUR BOYS



Interior of One of the Nine Ward Cars Showing Three-Tier Arrangement of Cots and the Fan Installation

Arranged for Sitting Patients, the Cots Adjusted to Form Seats: The Train Embodies the Experience Gained by the British in Three Years of Warfare, and Accommodates 393 Wounded Men and a Staff of 57 Attendants

The First of a Series of Up-to-the-Minute Ambulance Trains to be Completed by an English Company for Our Troops



TOKYO TRADERS HOLD WORLD RECORD FOR NOISE

TO those who have no taste for war, but nevertheless crave excitement, the Tokyo Stock Exchange is recommended most highly. Trading on the floor of that great institution is no silent drama of colorless business transactions, as the picture above might lead one to suspect. On the contrary it is about the most animated and clamorous exhibition of buying and selling that is to be seen or heard anywhere on earth. The din of the New York Stock Exchange and the far-famed roar of the Chicago grain pit combined would have to be amplified to compete with the commercial clamor of the Japanese exchange. Trades there are made in much the same way as in Wall and La Salle streets, but in addition to yelling and wigwagging, Tokyo brokers clap their hands —and at this they are unquestionably world champions. Records of sales are kept in books, instead of on cards. Every trader carries a fan and most of them wear black kimonos, but the recorders of prices are dressed in European style.

SEED STREWN BY WRECK BEAUTIFIES HIGHWAY

For half a mile along the Lincoln Highway, in the section between Rawlins and Wamsutter, Wyo., the unvarying color of the landscape is relieved by a mass of flowers as surprising to the traveler as they are beautiful. Here the highway follows the old Union Pacific Railroad right of way and it is said that years ago a freight car containing a consignment of flower seeds was wrecked at this point. That misfortune proved to be a blessing in disguise, for the scattered seeds took root and flowers in great numbers have sprung up perennially since then.

A Wyoming Section of the Lincoln Highway Where It Passes through a Mass of Flowers, Originally Springing from Seed Said to have been Scattered by a Railroad Wreck

GOVERNMENT-BUILT BARGES FOR THE MISSISSIPPI

The government is to build four towboats and 24 barges for freight service on the Mississippi River, the United States Shipping Board having allotted $3,360,000 for their construction. While the details of the barges have not been announced, it is said that they will be 300 ft. long and 48 ft. wide and will carry 750 tons on a 4-ft. draft, while with a 6-ft. draft their capacity will be 1,800 tons. The towboats will be of the stern-wheel type and will develop 1,500 to 2,000 hp. They will be equipped with the most modern machinery and boilers. The operating program of the fleet has not been made public.

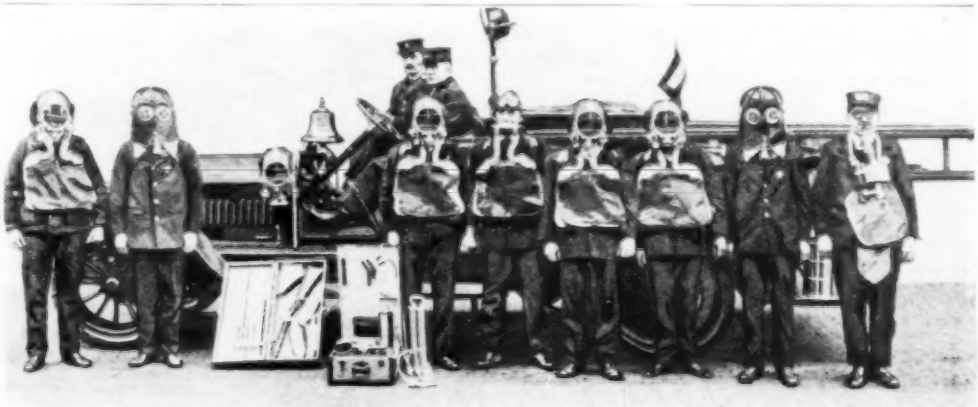
FIRE FIGHTERS OUTFITTED FOR LIFE-SAVING

Equipment adequate for almost any kind of an emergency has been supplied to the lately organized life-saving squad of the Cincinnati fire department. The crew is centrally stationed and provided with a speedy truck that carries chemical tanks, gas helmets, a resuscitator, a small Lyle gun, an oxy-acetylene torch, jacks, and other paraphernalia. Picked men, who have demonstrated their resourcefulness in emergencies, compose this important organization.

DISPLAY CASE FILLS MIDDLE PART OF REVOLVING DOOR

Display-window space has become so valuable that one city department store is making use of the central portion of a large revolving door at the main entrance of the establishment. A glass case, equipped with shelves on which merchandise is exhibited, utilizes an area that otherwise would be wasted. The scheme has an advantage that the ordinary show window lacks. Situated as it is, it attracts patrons both when they are entering and leaving the store. A last-instant suggestion often is a sale producer, in any line of business.

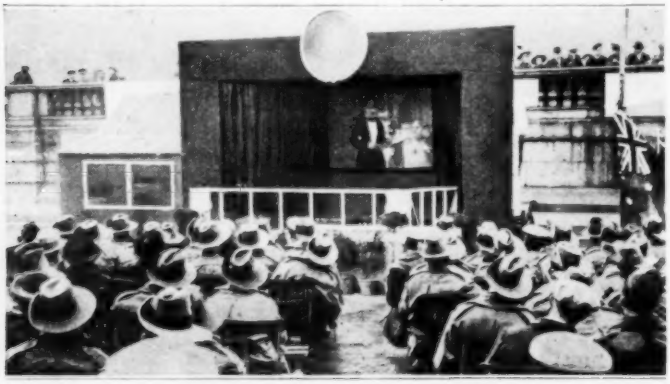
Articles Displayed in the Door Case Attract the Attention of Patrons When Entering and Leaving the Establishment



Special Life-Saving Squad of Cincinnati Fire Department in Full Regalia: The Men are Well Equipped for Nearly Any Kind of an Emergency That might Tax Their Resourcefulness and Bravery

OUTDOOR DAYLIGHT MOVIES FOR TOMMIES IN LONDON

Movies are being presented in an outdoor daylight theater in Trafalgar Square, London, for the entertainment of the Tommies. A screen is darkened sufficiently for motion-picture purposes by being set at the back of a stage sheltered by heavy curtains on either side and by suitable shades stretched above it.



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A Daylight Motion-Picture Theater in Trafalgar Square, London, Where British and Colonial Troops are Entertained under the Auspices of the Australian Government

NORWAY USES WHALE FAT IN MAKING MARGARINE

Following the example of Denmark, which has been using hardened whale oil for about three years in the margarine industry and in lard making, Norway has at last turned to this substance on account of the shortage of other materials. This involves the inauguration of whale fishing off the coast of Norway, which has been prohibited for a number of years on the theory that it frightened the fish away and that the offal from the whaling stations was detrimental to the fish. Experience in Denmark shows that margarine properly made with hardened whale fat tastes well and looks well, and that when used in lard making compares favorably with lard imported from America.

RECONSTRUCTED HUT RELIC OF HESSIAN DAYS

As a reminder of the dark days in our history when the Huns were not "3,000 miles away," a replica of one of the huts that sheltered the Hessian troops on Inwood Hill, Manhattan Island, in revolutionary times has been reconstructed at Broadway and 204th Street, New York. It is built of stones excavated from the ruins of some 40 of the barracks that have of late been uncovered on the east slope of the historical ridge, and of timbers of a Long Island barn erected in the latter part of the eighteenth century. It contains many of the relics that have been recovered during the excavating, which has been carried on for several years.

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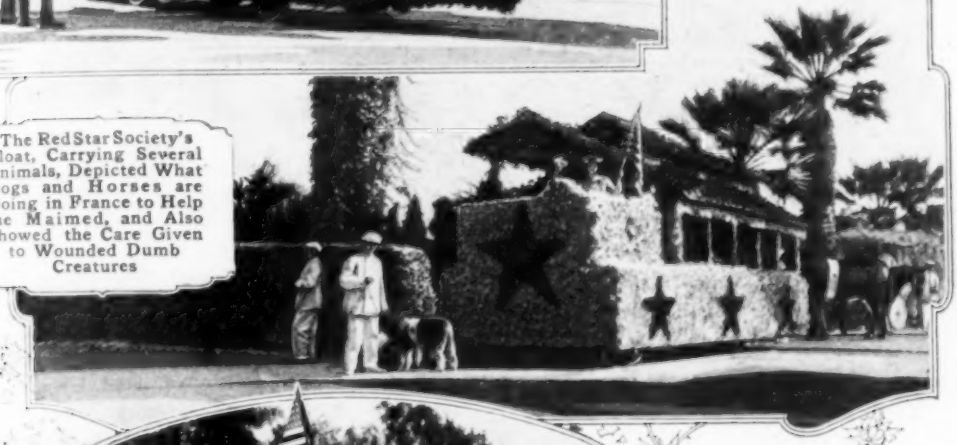
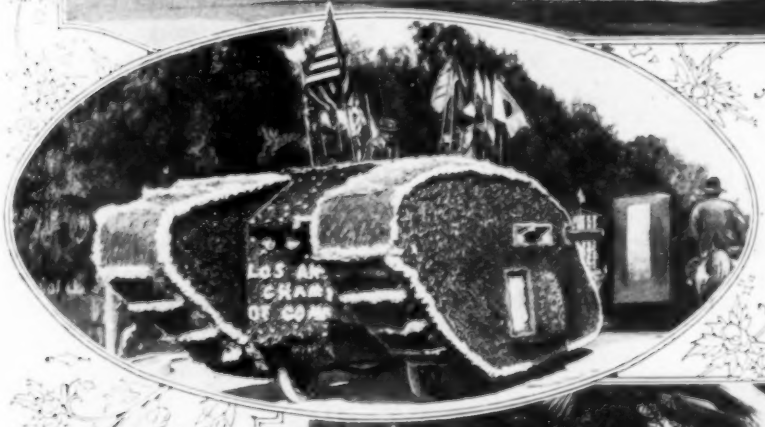
A Silent Reminder of "Kultur" in America: Replica of One of the Many Huts Built by the Hessians on Manhattan Island in Revolutionary Days

WAR REFLECTED IN PASADENA ROSE TOURNAMENT

Uniformed Sailors with Guns and Searchlights Lent Realism to This Patrol Boat. One of Many Distinctly War-like Floats in a Three-Mile Parade Held in Connection with Rose Tournament



The Red Star Society's Float, Carrying Several Animals, Depicted What Dogs and Horses are Doing in France to Help the Maimed, and Also Showed the Care Given to Wounded Dumb Creatures

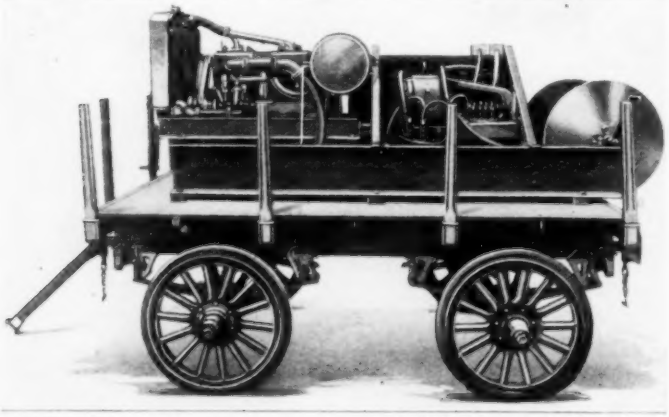


A Beautiful Model of a British Tank, One of the Big Hits: It Stood 15 Feet High and was Covered with Smilax, Chrysanthemums, and Gray Acacia. Sixteen Directors of the Los Angeles Chamber of Commerce, in British Soldiers' Uniforms, Rode beneath the Allied Flags

A Striking Effect in Black and White: Pampas Plumes Made This One of the Most Conspicuous Autos in a Parade in Which 3,000 Persons Shared. It is Estimated That There Were 250,000 Spectators

ELECTRICAL PIPE-THAWING OUTFIT USED BY CITY

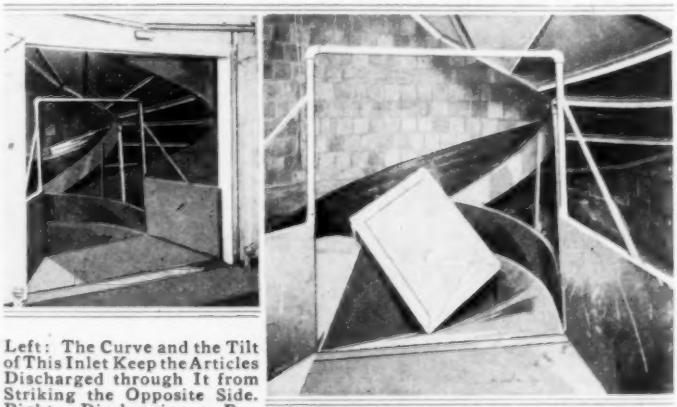
For thawing frozen underground service pipes, the water department of Minneapolis used with efficiency an electric apparatus during the severe part of the winter. It consists essentially of a four-cylinder gasoline motor connected with a direct-current generator that develops a 500-ampere, 40-volt current. Five hundred feet of insulated copper cable wound on a reel, and a control board, complete the outfit, which is carried on a substantial trailer. The equipment is designed for thawing pipes of less than 3-in. diameter, and particularly for ordinary residence service pipes, which are usually of ¾-in. size. In use, one line of the cable is attached to the nearest hydrant and the other to a pipe, faucet, or sill cock on the premises where the work is to be done. The current flows through the hydrant to the main, from it to the service pipe, and back to the machine. Since the frozen pipe offers much resistance, it becomes heated sufficiently to melt the ice within. As an index to the working ability of the outfit, 250 ft. of 1¼-in. pipe were thawed in about 30 minutes. Work that usually would cost a consumer about $50 is accomplished electrically for approximately five dollars.



The Pipe-Thawing Apparatus Consists Principally of a Gasoline Engine and Electric Generator Mounted on a Trailer

SPIRAL GRAVITY CONVEYOR HAS IMPROVED INLETS

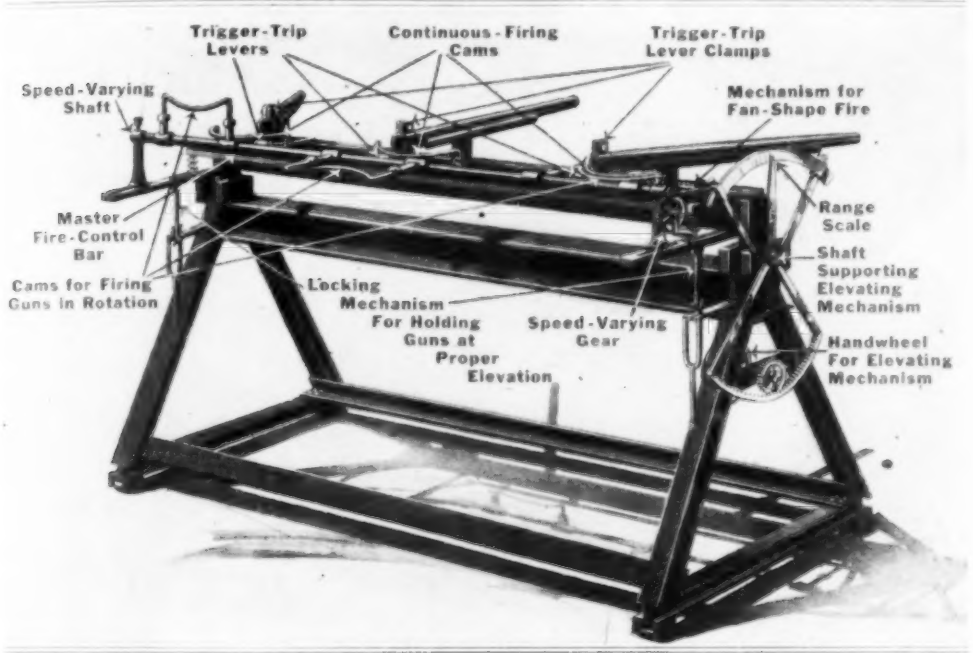
A spiral gravity conveyor, by which boxes or bundles can be transferred from one floor of a factory or warehouse to a lower level, has as a special feature curved branch inlets on intermediate floors. These, instead of entering the main passageway at right angles, form a tangent in each case so that packages discharged into the passage will not strike the opposite side. A continuation of the inlet in the form of a curved tapering strip extends into the main chute and assists in starting the bundles in the right direction.



Left: The Curve and the Tilt of This Inlet Keep the Articles Discharged through It from Striking the Opposite Side. Right: Discharging a Box into the Spiral Gravity Conveyor through a Curved Branch Inlet. Both the Main Chute and the Inlets Are of Metal

SIX MACHINE GUNS FIRED BY SINGLE OPERATOR

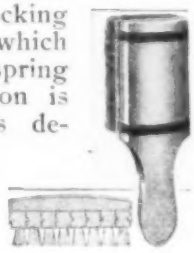
To increase the deadliness of the machine gun, an American inventor has come to the fore with an apparatus that enables from two to six of the weapons to be handled by one operator and two assistants. The rifles can be fired separately, in groups, or simultaneously, as conditions dictate. They are mounted in a rack and controlled by different devices that regulate their respective elevations, ranges, and rates of fire. With the contrivance it is possible for one gunner to sweep six targets of varying ranges at the same time, or concentrate the whole fury of the battery upon one of them. If one or more of the rifles jam, or for some other reason fail to function, the action of the others is not interrupted. While the rest of the battery is firing, a crippled gun can be removed and another substituted in its place without causing interference. For use against air craft, the guns can be elevated to the desired degree and used in the same flexible manner as just outlined. The finder and elevating device are intended to eliminate inaccuracies, for the one determines the range with mathematical precision, while the other overcomes the common errors made in sighting. The actual operation of the guns is taken care of by one man. His assistants supply fresh cartridge belts to the rifles.



Multiple Machine-Gun Operation Rack That Enables One Marksman to Sweep Three Targets of Varying Ranges Simultaneously, or Concentrate the Fury of the Whole Battery on One of Them

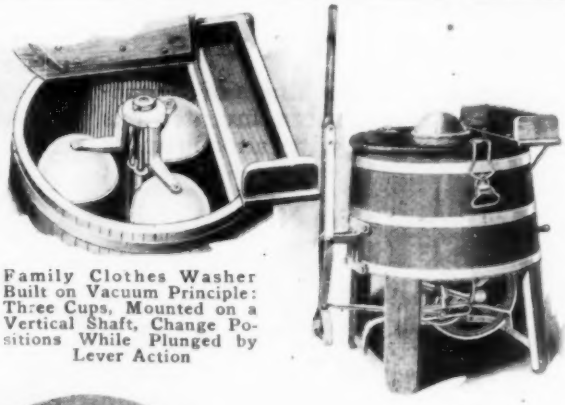
DEMOUNTABLE BRUSH IS EASY TO CLEAN

A brush that may be completely dismantled has obvious sanitary advantages. The rows of bristles are mounted on interlocking removable segments which are held in place by a spring clip. This construction is applicable to brushes designed for a variety of purposes. Worn bristle segments may be replaced.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

After Coffee is Made by the Drip Process, the Top Container is Removed and the Symmetrical Pot Used for Serving



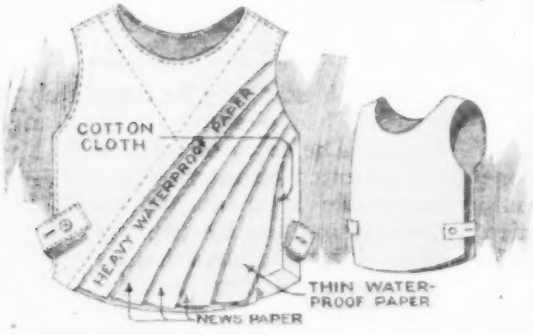
Family Clothes Washer Built on Vacuum Principle: Three Cups, Mounted on a Vertical Shaft, Change Positions While Plunged by Lever Action

"Two-Cylinder" Egg Beater Permits Whites and Yolks to be Beaten Separately in One Operation

New Pull Socket with Current Tap at Side to Enable Electric Accessories to be Used at a Table without Sacrificing a Lamp

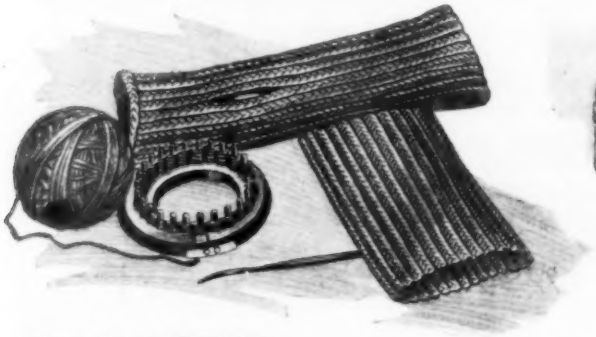
The Rubber-Soled Sandal Gaiter Is a Trim Shoe Protector for Rainy Days

Rubberized-Silk Hot Water Bottle Supplied with Leather Case: Particularly Convenient for Travelers. Price $8



Khaki-Covered Paper Vest, for Trench Wear: It Is Warm and Moisture-Proof, a Real Comfort on a Cold, Windy Night

Watch with Luminous Dial in Carrier Attached to Belt and Suspended in Pocket. Price $3

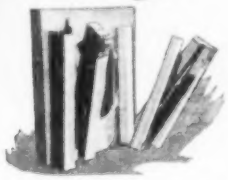


Knitting Frame, Consisting of Wooden Ring with Pegs, That Facilitates Work of Making Wristlets and Armlets for Soldiers

A Dependable Harness That Holds an Energetic Youngster in His Perambulator or High Chair, Eliminating the Danger of Falls. Price $1

Radiant Bead for Electric Socket Chains: Light is Emitted by a Tiny Bar within a Glass Tube. Frequent Exposure to Sunlight Is Unnecessary

Handsome Nut Bowl of Rich Color with Ornamental Metal Cracker, Shaped Like a Squirrel, Attached to Its Rim. Price $4



Collapsible Washstand with Hinged Mirror and Towel Rack, Intended for Campers and Other Outdoor Enthusiasts

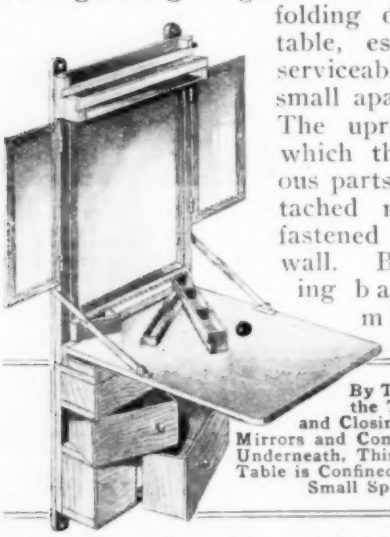
Waterproof Hat Cover Made of Paper for the Woman Who is Caught in a Rainstorm. Price 10 Cents

Novel and Decorative: An Unusual Lamp for Night Use in a Girl's Boudoir. Price $3.50

Waterproof Checkerboard, Pocket Size, Designed for Soldiers. Price 50 cts.

DRESSING TABLE FOLDS INTO SMALL SPACE

A compact article of furniture possessing a large degree of utility is a folding dressing table, especially serviceable for a small apartment. The upright to which the various parts are attached may be fastened to the wall. By turning back the mirrors

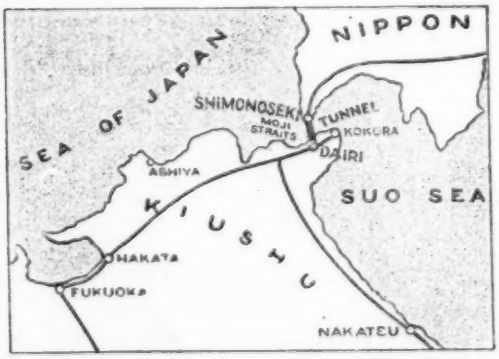


By Turning Up the Table Top, and Closing the Side Mirrors and Compartments Underneath, This Dressing Table is Confined to a Very Small Space

hinged to either side, and letting down a hinged leaf that serves as a table top, a large mirror is revealed. Below are several swinging compartments for toilet articles or clothing.

LONG TUNNEL BENEATH SEA PLANNED BY JAPAN

Plans for a railway tunnel, costing approximately $7,000,000 and extending under the sea for about one-fourth of its length of 17,700 ft., have been made in Japan. The project is backed by influential citizens in the Prefecture of Fukuoka, which will be served by the tunnel, in the southwestern part of the empire. The bore will pass beneath Moji Straits, connecting Shimonoseki and Dairi, making possible a junction with the railway trunk line of Kiushu. It is estimated that five years will be required to complete the project.



Map Showing the Location of the Proposed Tunnel, 17,700 Feet Long, That will Pass beneath Moji Straits

COMMERCIAL AVIATION SEEN AS AFTERMATH OF WAR

Within recent weeks the Aerial Mail Service Committee has been superseded by the Civil Aerial Transport Committee, which is charged with evolving a comprehensive aeronautic program for the conservation and development of America's war-time aviation investment by its post-war utilization. To this body falls, therefore, the task of preparing for our future use of the air as a national and international highway. In doing this, it will build the foundation for the conversion, upon the cessation of hostilities, of the human skill and material resources of the military flying service to civil purposes. It is realized that the country will suffer tremendous loss if, with the establishment of peace, some real use is not made of the hundreds of expert fliers, thousands of planes, the well-equipped training schools and flying fields, and the air-craft factories now tuned to high production. Such things as the "road rules" of the air, ownership of air above private property, the right of landing, questions of police and registration, the mapping of air currents and air ways, and the location of airdromes, are matters that require consideration. Also the problems of collecting customs on international aeroplane freight, and the questions of ports of entry, and the reciprocal use of landing places are presented. Plans are now under way for the aerial patrol of our coasts and for mapping the whole of the country through the aid of aerial photography. The Post Office Department is already taking steps for the eventual establishment of aerial mail

service. Subject to congressional approval, it will receive from the war department all serviceable planes that are not useful for military purposes. The work of the civil committee has no relation to the war program.

TAR PAPER USED TO KILL WEEDS IN CANE FIELDS

A Hawaiian sugar-cane grower has devised a labor-saving method of eradicating weeds from his fields by smothering them. After the harvest, the rows of stubble are fertilized and then strips of light tar or asphalt-felt paper are laid over them and weighted down with stones and dirt. The sharp points of the new cane shoots are strong enough to penetrate the paper, though they may be assisted by slitting it where they are seen to be pressing up from beneath. The weeds, being unable to pierce the covering, soon wither and are dried up by the heat radiating from the under side of the paper. It is said the increase in yield has averaged 10 tons per acre.

FRUIT PICKER DESIGNED ON NEW LINES

A new fruit picker with which the user can reach all parts of a fruit tree,

consists of a long bag mounted on the end of a bamboo pole, the mouth of the bag being encircled with a row of sharp teeth, inclined inward. By placing the mouth of the bag around an apple or other fruit, and then giving the picker either a thrust or a pull, the stem will be cut and the fruit fall into the holder.

"WINDOW-SHADE" SCENERY FOR TRAVELING TROUPES

In these days of transportation difficulties there are many advantages to

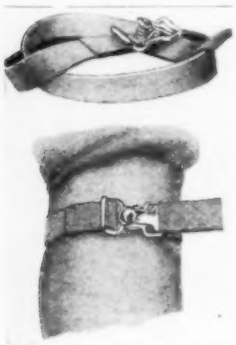
Changing a Stage Set by Raising One "Curtain" and Disclosing Another, a New System That Eliminates Scenery of the Conventional Character

be gained by simplifying, in a practical way, the scenery carried by theatrical troupes on the road. Recent efforts in this direction have resulted in the evolution of a new type of setting that facilitates handling both on and off the stage. By adapting the principle of the ordinary window shade, scenery has been reduced to a series of frames holding several heavy spring rollers on which painted drops are wound. In use the curtains are drawn across the front of the racks and clasped in the order they are needed. When changing a setting the outermost drop is rolled up so that the one next in order is brought into view.

The Red Cross announces that it cannot spare cargo space to carry trench candles and ration heaters to Europe, and urges that the making of these articles for the Red Cross be stopped at once.

RUBBER TOURNIQUET MADE LIKE LEATHER STRAP

For the first-aid kit, a rubber tourniquet that in an emergency might be applied with one hand, has been introduced. It consists of a rubber strap, ⅛ in. thick and nearly 1 in. wide, supplied with a spring clasp. It is drawn to the desired tension as if it were a belt.



HACKSAW FOR CUTTING ROUND HOLES

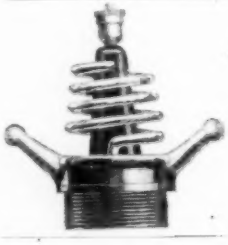
A tool recently put out which is a saver of time and labor for electricians, garage men, steam fitters, sheet-metal workers, etc., is an expanding rotary hacksaw for making round holes in metal, wood, slate, and marble. It cuts pipe sizes ranging from three-quarters of an inch to four inches.

PREPARE TO PHOTOGRAPH SUN'S TOTAL ECLIPSE

Preparations are being made by astronomers in this country to observe the total eclipse of the sun which will occur June 8 and will be visible in its totality to persons located within a strip some 60 miles wide extending diagonally from the State of Washington to Florida. The scientists consider it fortunate that the University of Denver observatory is located very close to the center line of the shadow's path. Arrangements will be made to take photographs of the eclipse at that place, where its duration will be approximately 88 seconds. As a precaution, in case of cloudy weather at Denver, another group of observers will be stationed at Green River, Wyoming.

STEAM CONDENSER REPLACES MOTOR-CAR RADIATOR CAP

For motor cars a vapor condenser, particularly serviceable in winter when alcohol is used to prevent freezing, has been designed to replace the radiator cap. It is a hollow cone supplied at the top with a safety valve and encircled by a spiral coil of copper tubing. Instead of escaping into the atmosphere when in a vapor state, the cooling medium, whether it be alcohol, a special mixture, or plain water, is condensed by passage through the air-chilled coil, and returned to the radiator. The valve acts if excessive steam pressure results from overheating the engine. The size and design are such that the device is not unsightly.



EXIT SIGN SHOWS IN DARK WITHOUT AID OF LAMP

Because ordinary exit signs, lighted by electricity, gas, or even oil lamps, cannot always be depended on, self-luminous material has been employed in lettering a new type of sign. Its visibility in the dark is dependent only on its being exposed periodically to light so that it can absorb light energy. This illumination is supplied by an electric bulb projecting immediately in front of it and covered with a reflector that throws the rays back onto the lettering. After all lights have been turned off, these letters remain visible.

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INCHES EQUAL HUNDREDS OF MILES BY PHONE

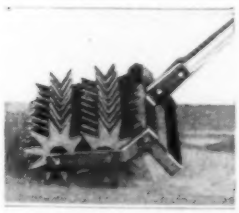
Telephone experts declare that if a person speaking over a phone holds the transmitter four inches from his mouth it is equivalent to adding about 220 miles to the line over which he is conversing. Carelessness in the manner of using a telephone instrument is one of the common causes for indistinct transmission. The best results are obtained by allowing about half an inch to intervene between the mouth and the transmitter.

METAL WEDGE FOR WINDOWS STOPS RATTLE OF SASH

To prevent the rattling of windows a simple metal article has been devised which fastens to the sash by means of a screw inserted at one end. Extending at right angles from the free end of the device is a spring-member head that can be inserted between the sash and the weather strip, effectually taking up any play that may exist between the two parts.

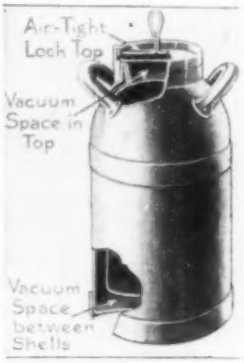
GARDEN TOOL IS WEEDER AND PULVERIZER

The chief feature of a new garden tool, which is a weeder, pulverizer, and leveler combined, is two sets of many-toothed disks mounted on parallel axles so that one is staggered with reference to the other. Soil is prepared by moving the implement back and forth like a rake, a horizontal blade back of the disks assisting in breaking up the clods of earth and pulverizing them.



INSULATED MILK CAN KEEPS CONTENTS COLD AND SWEET

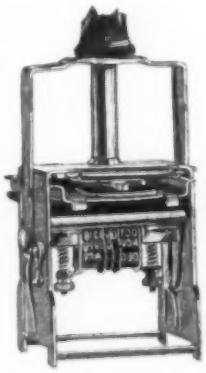
To provide continuous refrigeration for dairy products during their shipment from producer to dealer, an all-metal vacuum container has been introduced. It is of durable and sanitary construction and provided in different sizes, all of which are fitted by a cover of standardized dimensions. So far as its general external appearance is concerned, the receptacle might readily pass for an ordinary milk can.



COPYRIGHT, BURTON O. SMITH

SELF-INKING DESK STAMP HAS SHIFTING PAD

In providing a special shifting pad for a self-inking rubber stamp which has just been placed on the market, the makers have supplied a feature which greatly prolongs the article's usefulness. The pad is about twice as wide as the die, and with the making of each impression it shifts its position by sliding a fraction of an inch in the grooves in which it is set. In this way the ink is taken from all parts of the pad alike and no particular portion is more worn than the rest. Mounted above the pad are a ratchet wheel and two spring-held pawls which cause a cam to revolve. The turning of this cam makes the inking device move slowly back and forth. The stamp is operated in the usual manner.



VARIED GLIMPSES OF CHILDREN'S ACTIVITIES AND

A Wheelbarrow All Fitted Out for Gardening: There Are Brackets for Rake, Hoe, and Shovel, a Place for the Trowel, and Little Signs for Various Beds

When a California Boy Put a Bird House on Top of This Flagpole Folks Thought It Misplaced, but the Birds were Delighted

The Fondness for Coasters Seems to Be World-Wide. These Lads Have Made One on Which They Race Down Hills in Japan

An Ohio Youngster's Way of Teaching Temperance: The Tall Sunflower, 14 Feet High, was Fed on Buttermilk; the Other One, 30 Inches High, on Diluted Whiskey. The Man in the Picture Is Six Feet Tall

An Air Gun Made Like a Shotgun: It is Charged by Drawing the Hand Piece Back along the Barrel

A Hobbyhorse That Coasts or Rocks: The Rockers, being Hinged to the Feet, can be Turned Inward, Letting the Horse Stand on Four Casters. The Plaything is Painted in Bright Colors and Built for Hard Knocks

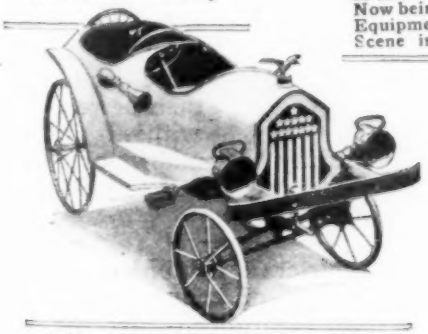
NEW ARTICLES MADE ESPECIALLY FOR THEM

A Fine Bench for Both Work and Play: Open, It Is Ready for Manual Training, with a Place for Every Tool; Closed, It Makes a Table for Games or Reading

An X-Ray Picture of a Puppy's Broken Foreleg Taken to Help the Doctor Set the Bones Properly: After a Few Weeks the Leg Was Well Again

A Cunning Eiderdown Suit with a Wee Tail, a Decorated Helmet, and Gauntlets, That Almost Changes the Little Wearer into a Bunny

Little Folks in Japan Love to Romp as Much as American Children and are Now being Provided with Modern Play Equipment Like Our Own, as This Scene in a Japanese Park Indicates

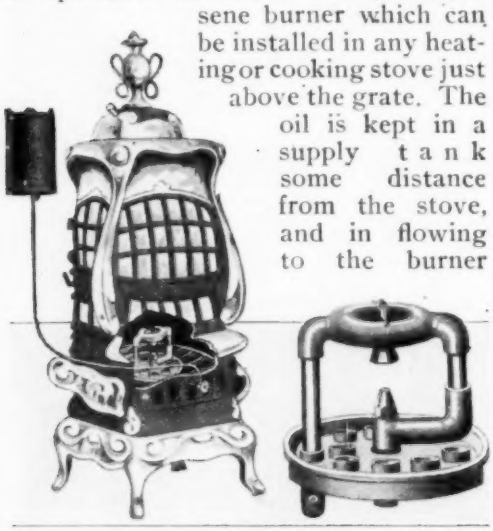


A Handsome Little Auto Driven by Foot Power: There Are Pedals for Two Pairs of Feet and a Steering Wheel, Horn, Bumper, Headlights, and an Extra Wheel

A $1,000 Playhouse with Marble Steps and Elegant Furnishings: The Owner, a Little New Orleans Girl, Aged Four, Pays Taxes on It in Her Own Name

KEROSENE BURNER SUITED FOR USE IN ANY STOVE

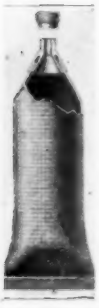
Simplicity of construction and ease of operation characterize a new kerosene burner which can be installed in any heating or cooking stove just above the grate. The oil is kept in a supply tank some distance from the stove, and in flowing to the burner



A New Kerosene-Burning Outfit with a Gravity Feed, Which can be Easily Installed in Any Heating or Cooking Stove

passes through a hollow ring located above the nozzle, so that heat from the latter converts the oil into gas. The parts are heated at the start by burning a little oil in the pan beneath the jet. Water is admitted into the system periodically, which becomes steam, on reaching the generator, and removes any accumulated carbon.

COLLAPSIBLE CLOTH TUBES TO CONSERVE METAL



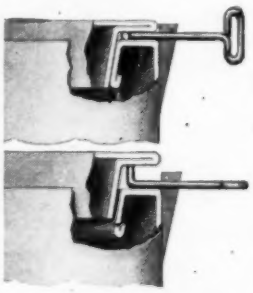
A collapsible tube of strong, impregnated, air-tight cloth has been constructed to avoid the waste of costly metals heretofore used for the purpose. The tube has seamless walls and the ends are double-lapped and sealed. The tensile strength of the cloth tube is greater than that of the metal containers. Compositions of lead have heretofore been used for tubes.

NEW CARD GAMES TEACH FRENCH AND SPANISH

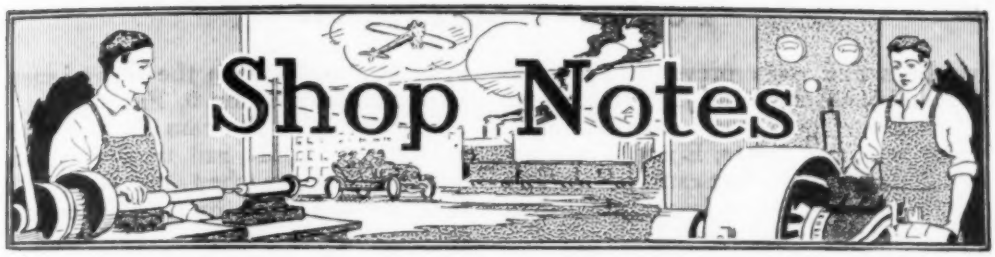
A card game has been invented which makes the learning of elementary French or Spanish a pastime. Each deck consists of 61 numbered cards, the Spanish and French decks being similarly compiled. The matter on each Spanish card includes a numbered question and its answer, in Spanish, with the pronunciations indicated phonetically, and a translation of the question. There is also an answer in Spanish to a question on another card, a cartoon; and a "grammar comment." The game begins by the first player reading a question in Spanish from one of his cards after which the second player reads the proper answer in Spanish. The questioner's card enables him to check up on his opponent's pronunciation and so determine the score. Later in the game other features are introduced which teach grammar, idioms, and new words.

PAIL WITH TIGHT-FITTING LID HAS RELEASING KEY

An improved type of can or pail, for sirup, paint, etc., having a flanged cover that fits down tightly into the top, is provided with a releasing key that projects from one side. By turning the key the cover is pried loose and may then be removed without difficulty or any injury to container or cover. The device may be left permanently attached to the pail.



¶ Because air-craft exhibitions might prove a means of conveying to the enemy facts regarding our recent advance in the science of flying, all such exhibitions have been prohibited, by presidential proclamation, for the period of the war.



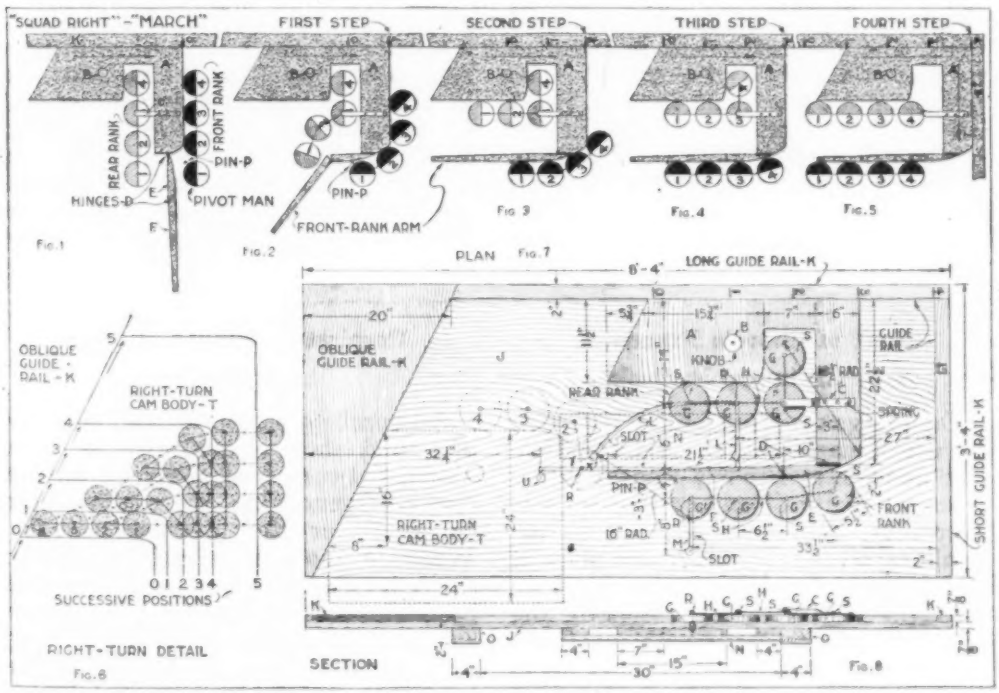
A Machine That Executes Military-Drill Movements

By LIEUT. FRANK SHORT

THE squad-right and right-turn machine described and illustrated herewith is designed to be of service to the man who has difficulty in grasping the details of these two fundamental military-drill movements. Any company commander can have such a machine constructed, and it will illustrate the movement in a way that cannot be equaled by any verbal or graphic description.

Construction of the machine requires no elaborate equipment, and all necessary dimensions are given to permit the proper shaping of the cam surfaces. The scale of the whole may be changed at discretion.

In operation, for "squad right," the cam A is placed on the table, as in Fig. 1, with the long edge in contact with the long guide rail K, and with the square corner in line with the division point 0. The front-rank men, being linked together as indicated by H and S, in Figs. 7 and 8, are lined up touching the right-hand outside edge of the cam, as in Fig. 1, the bolt R of the pivot man passing through the slot M,



Fundamental Military-Drill Movements are Executed on the Machine in a Manner Which Points Out to the New Recruit the Exact Position He should Occupy during Each Successive Movement. After Learning the Movements by Watching the Mechanical "Men" He Has Little Difficulty in Taking Up the March

washers and nuts preventing its being pulled off the table J. Parts N and O indicate structural details. The front-rank arm joints, E and F, extend parallel with the short cam surface and to the right of the front rank, thus avoiding the rear rank. In the latter, No. 2's pin passes through the curved guide slot L, at its extremity, X, while No. 3's pivot pin, S, which is longer than the others, is held in the cup of the holding spring C. No. 4 rests against the inner surface of the cam in the same relative position as in the illustration, and No. 1 is in prolongation of the line of the other three.

When the knob B is pushed toward the short guide rail, keeping the long side of the cam in contact with the long guide rail, the successive changes in the movement are executed, as shown in Figs. 2, 3, 4, and 5. The squad is in line in the new direction when the cam reaches the short guide rail, and is caused to step off in the new direction by a movement of the cam in that sense.

To make a right turn, the pin P, shown in Fig. 7, is removed from the table, and the movement is executed for one rank only by the cam T. The front rank of the squad is used, No. 1 being placed with its bolt R in the opening of the slot L, at U. The rank is placed in the extension of the long slot, and the cam T is placed with the oblique edge parallel with the oblique guide rail K, and with the adjacent edge in contact with the line of men, as shown in position 0, Fig. 6.

Movement of the cam parallel with the oblique guide rail until the long guide rail is reached completes the turn, as indicated by the successive movements in Fig. 6. The rank is caused to take up the full step by moving the cam along the long guide rail.

The execution of squad right by the machine is nearly perfect. By changing the number and spacing of the division points on the guide rails, the machine will satisfy a "six-count" advocate as well as the "four-count" faction, for which it is marked out. Right turn is not so accurate. No. 1 and No. 2 are approximately correct in their action, but Nos. 3 and 4 oblique are at too steep an angle and make the second oblique just before coming into the line, which is advancing at somewhat less than a half step. The movement, however, is sufficiently accurate to give a clear idea of the proper execution, and is an excellent illustration.

In both movements the machine may be operated fast or slow, or may be stopped in any position. Each man of a squad may watch the path of his corresponding "man" on the machine and is presented with a clearer idea of where he belongs at each instant than is obtainable from talks or sketches. In addition, the machine itself is interesting to the men, and aids to incite interest in the performance of the movement.

Theft of Shovels Prevented by Chain and Padlock

On a large construction job requiring the use of many hand shovels, considerable annoyance was experienced in the repeated thefts of one or two shovels overnight. This was stopped by assembling all the shovels in one place at night, and running a strong chain through the D-handles, fastening the two ends of the chain with a reliable padlock, and attaching the entire lot to a heavy tool box.—Roy H. Poston, Flat River, Mo.

Respirator Made of Cotton and Muslin

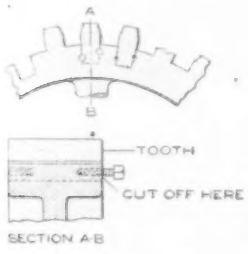
An excellent respirator may be made of a thick sheet of carded cotton wool placed between two pieces of muslin. For emergency use the material can be pieced or tied together suitably. Where a more substantial article is desired, for use in shops, buffing rooms, by janitors in sweeping dusty floors, etc., the cotton can be covered neatly in a strongly sewed mask, with tie ribbons at the back.—William A. Lorence, Richmond Hill, N. Y.

Drawings Superseded by Others Plainly and Promptly Marked

When a drawing for shop or construction use is superseded by another, the original should be plainly marked "Superseded," and the title, serial number, and other designations of the later drawing should also be marked on the first one. This safeguard takes only a few minutes' time, and may save costly errors by the issuance of the wrong drawing.—C. H. Post, Denver, Colo.

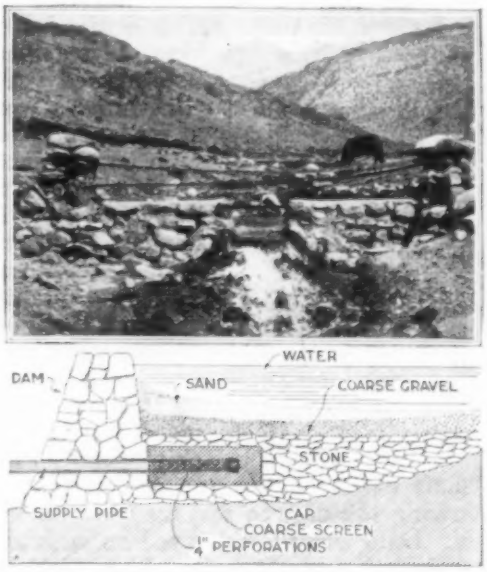
Patching Teeth into Broken Gears

Costly gears, having one or several teeth stripped, may be repaired to render indefinite service by fitting new teeth as illustrated. A slot is first cut into the gear flange to remove all traces of the broken tooth, and a new tooth is fitted as indicated at AB. A cap screw, threaded in on either side of the new tooth and cut off flush with the gear flange, precludes all possibility of the insert working out.



Small Water-Supply Reservoir Built in Mountain Stream

Securing a supply of clean water from a stream at all times is satisfactorily accomplished by the following method: A part of the stream is chosen where there is a fall of at least 1 ft. in a distance of 30 ft. The water is then temporarily diverted, and a dam built across the channel. A clear-water delivery pipe is then installed as near the bottom as possible. A spillway should be provided large enough to take care of maximum overflow. The supply pipe should terminate several feet inside the wall, being plugged at the end. The water enters through a series of ¼-in. perforations along the pipe. A wooden framework covered with coarse wire netting surrounds the intake end of the pipe. Over the framework and the bottom of the channel a layer of large stones is placed. The stones are covered with gravel or chippings, and then with a layer of sand. Clarification will depend upon the thickness of the uppermost surface.



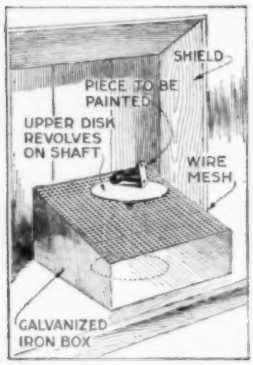
A Steady Flow of Water Free from Surface Dirt is Obtained through the Pipe

Door Knobs Make Convenient Handles for Bits

An excellent handle for boring bits, screwdrivers, and similar tools, for use in cramped places, is a discarded doorknob. For occasional use it will be found satisfactory to use the knob without any alteration, simply inserting the bit into the socket and tightening with the screw. The bit has a tendency to wobble slightly, but otherwise is held securely. By beveling off the end of the hole in conformity with the shape of the bit shanks, or by filing off the shanks to an even thickness, a perfect fit is obtained.

Small Machine Parts Painted by Use of Novel Device

When a rush order was received in a factory for parts which demanded a coat of lead, a spraying device was constructed as illustrated. Over a galvanized chip pan a piece of heavy iron mesh was placed. A disk, 12 in. in diameter, with a bearing operating on a piece of 1-in. shafting, was mounted on an iron base and placed inside the chip pan. The shaft extended through the mesh, allowing the disk to revolve 6 in. above it. Lead was then sprayed on with an ordinary spray nozzle. The disk is spun around on the shaft by the application, covering the parts on all sides. All waste paint was caught in the pan to be collected and used again. A splatter shield is placed behind the pan.



Rack for Flat Tools

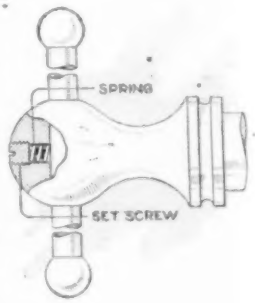
Every user of drafting tools knows what a nuisance it is to search for triangles, protractors, and other flat tools under a mass of sketch paper and other accessories. By making a rack for these tools, and once getting into the habit of placing unused tools on the rack, much time can be saved, and the temper of the draftsman frequently preserved. The rack shown in the sketch was made from a block of wood, the grooves being cut on the circular saw, or by hand. The edges of the grooves should be rounded slightly so that the tools can be slipped into place easily.

Sandpaper Prevents Slipping of Work in Miter Box

The creeping of small pieces of work, which are being sawed in a miter box, is often almost unpreventable, especially when hard wood is worked. To overcome this, glue strips of No. 1½ sandpaper on the back of the miter box, ⅛ in. from the floor of the box. This is particularly suited to wooden miter boxes, though it can also be applied to the steel box. This method does away with slipping, and does not affect the accuracy of the box, or freedom in handling the work.

Friction Lock Keeps Vise Ball Point from Injuring Fingers

Pinched fingers, such as frequently result from the ball points of a vise dropping on a workman's hands, may be avoided by the installation of a friction-locking mechanism, as illustrated. The spring and set-screw can be located on any convenient part of the vise screw. The shifting lever should be removed to make the addition.—George F. Kuhne, East Rutherford, N. J.



Coin Is Handy Gauge for Spark-Plug Gap

The ignition spark on a spark plug for gasoline motors jumps across a gap of about 1/32 in., between the center wire, or electrode, and the wire connected to the body of the plug. Motorists not skilled in adjusting the size of the gap, which may for some reason be wrong, will find a ten-cent piece a handy gauge for the spark gap, the adjustment being made, of course, with the usual precaution against the presence of an electrical current.

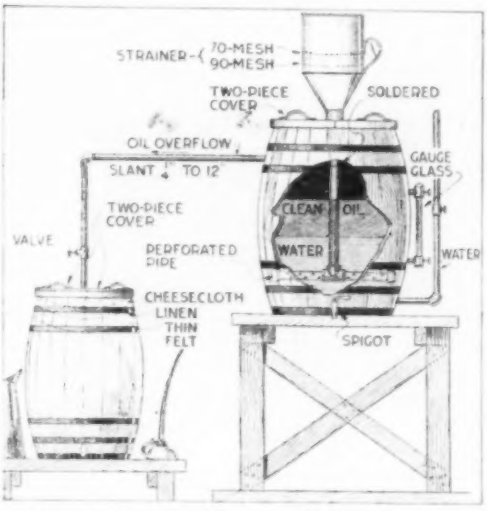
File Handles Convenient on Large Tee Wrenches

File handles, bored out and fitted to the handles of a large T-wrench, provide a firm hold, minimizing the danger of injury by the slipping of the tool, especially when the hands of the workman are greasy. With a handle of this type, it is easier, also, to exert greater power on the wrench, without bruising the palms.

An Oil Filter and Tank for the Shop

An oil filter which may be constructed from two old casks in any small machine shop or garage will save many times its original cost in the reduction of oil bills. A 25-gal. cask and one of 15-gal. capacity are placed, as indicated, and connected by a pipe having a valve near the lower barrel. A ¾-in. water-supply pipe is led in near the bottom of the larger barrel, and a glass gauge is installed to determine the water level. A 2-in. vertical pipe, connected with a horizontal pipe at the bottom, is put through the head of the large barrel. The horizontal pipe is capped at both ends and has two rows of ⅛-in. holes drilled in it. A large funnel—an oilcan, as shown, may be used—is soldered to the vertical pipe and properly braced to the head of the cask. Two screens, one 70-mesh and the other 90-mesh, are soldered inside the body of the funnel, as shown in the illustration.

Water is let into the large cask to a depth of 18 in. and the perforated horizontal pipe is secured within 5 in. of the bottom. Used oil is poured into the funnel and is washed by rising through the water as it emerges from the perforations in the horizontal pipe. Sediment is deposited at the bottom, while the clean oil floats on top of the water until its level gets above that of the overflow pipe. When the valve in the overflow pipe is opened the washed oil runs into the clean-oil reservoir through a filtering layer of cheesecloth, and three layers of felt. This disposes of any foreign matter that may not have been removed in the washing. The filtering material should be removed and washed in kerosene

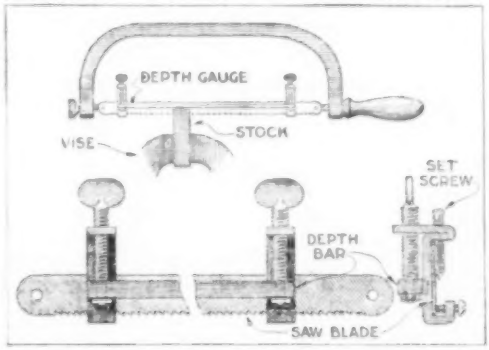


This Simple Filter Permits Old Oil to be Used Many Times

whenever sediment is apparent.—John E. Cahill, Jr., New York, N. Y.

Depth Gauge for Hacksaw

Cutting to a designated depth with a hacksaw is accurately accomplished by fitting the blade with a depth gauge as indicated by the sketch. Most of the parts essential for the making of such a gauge can be picked up about the shop so that very little machining or fitting is necessary. The finished

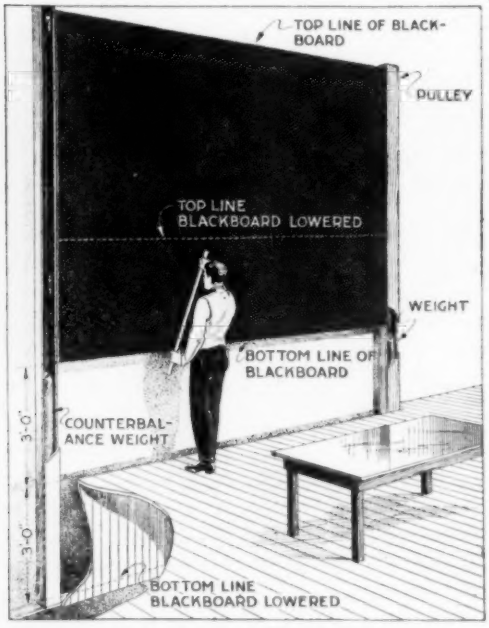


The Depth Gauge Eliminates Cutting Deeper than the Desired Distance

tool not only aids in accurate work but saves many broken saw blades as well.

Adjustability of Big Blackboard Makes Stepladder Needless

By mounting a large blackboard, or drafting board, in a sash and counter-



Either the Top or Bottom of the Board may be Brought to a Convenient Working Height by Lowering or Raising It

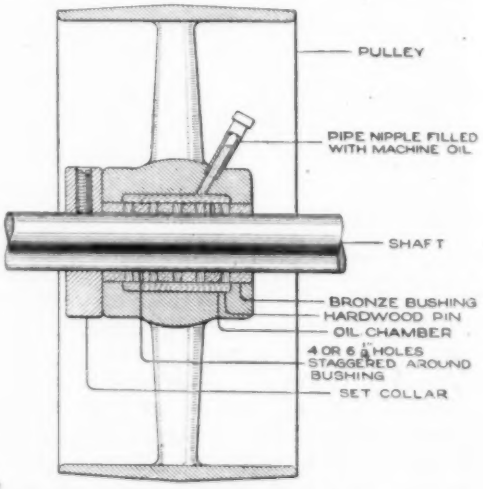
balancing it with weights, so that it may be raised or lowered like a window, the necessity of using a stepladder when working near the top, or of bending in an uncomfortable position to reach the bottom, is obviated. The convenience of the arrangement is made apparent and the plan of construction indicated clearly by the accompanying illustration.—Kingston Forbes, Flint, Mich.

Loosening Rusted Engine Pistons with Hot Water

Engine repairmen are often confronted with the job of getting into shape an old gasoline motor, or similar engine, that has been rusted badly. The pistons in such an old engine were rusted fast and after trying various methods of soaking them in oil, they were loosened by the following method: The oil was permitted to soak thoroughly. Boiling water was poured into the hopper of the engine, and allowed to circulate around the cylinders only long enough to heat the cylinder walls but not to affect the pistons. The pistons were then driven loose with a wooden block and a hammer. It was necessary to drain the water out and to refill the jacket with hot water in order to loosen a particularly tight piston. This method freed the pistons after a half hour's work, where soaking them in kerosene for three days failed to do so. If the pistons are made of cast iron, the boiling water should be applied gradually.—Earl L. Botten, Boscobel, Wis.

Wood Inserts in Pulley Bushing Conduct Oil

Cutting and heating of shafts and pulley bushings is impossible if the parts, while in motion, are supplied with an abundance of good cool oil. An unfailing supply of oil may be secured to any large bushing by inserting hardwood pins, as illustrated. The pins allow the oil to ooze out as fast as it is consumed and deliver it over the



The Wooden Pins Distribute Oil Evenly over the Entire Bearing Surface

shaft in such a way that the entire surface is thoroughly lubricated.

Hot Water for the Boat

from Engine Exhaust

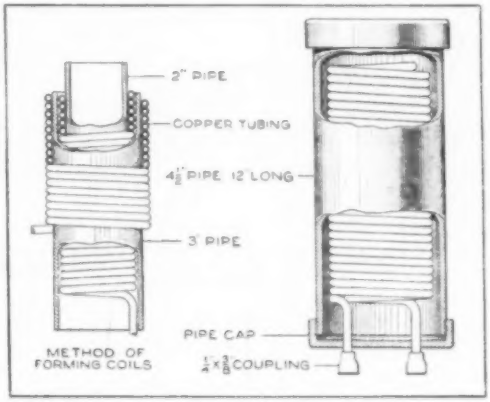
by B. Francis Dashiell

THE water heater illustrated is designed for use on small cruising motorboats, or any boat in which an internal-combustion engine furnishes the motive power and where hot water would be useful. It will provide hot water for both galley and toilet purposes, and while not under great pressure, will add much to the convenience and comfort of the craft.

The building and installation of the heater may be accomplished by anyone of fair mechanical ability and at very slight expense for the necessary materials. Inasmuch as the heat is derived from a waste product, it is operated without cost as long as the motor is in use. Heating of the coils also tends to cool the exhaust gases to some extent, resulting in an appreciable reduction of muffler noise.

The heater, as indicated in the sketch, is formed by wrapping copper tubing on a piece of 2-in. pipe to a length of about 9 in. This coil is then slipped off and placed inside a piece of 3-in. pipe. One end is brought around, and another coil wrapped on the outside of the 3-in. pipe. The pipe is then removed, leaving two coils, one inside the other, and with the ends projecting. A 4½-in. pipe, 1 ft. long, is then threaded at both ends, fitted with caps, drilled and tapped, to receive the exhaust pipes to and from the engine. Two holes must be drilled in one of the pipe ends to accommodate the two ends of the coils. If ¼-in. soft annealed tubing has been used, the two ends should be threaded and ¼ by ⅜-in. couplings screwed in.

Pipe connections should be provided which will permit the heater to be connected as near the engine as possible, to insure its getting the full effect of the hottest exhaust gases. It is also advantageous to cover the heater with several layers of asbestos, and rivet a covering of galvanized iron on top of the asbestos. This serves to retain the heat and results in heating the water to a high temperature.



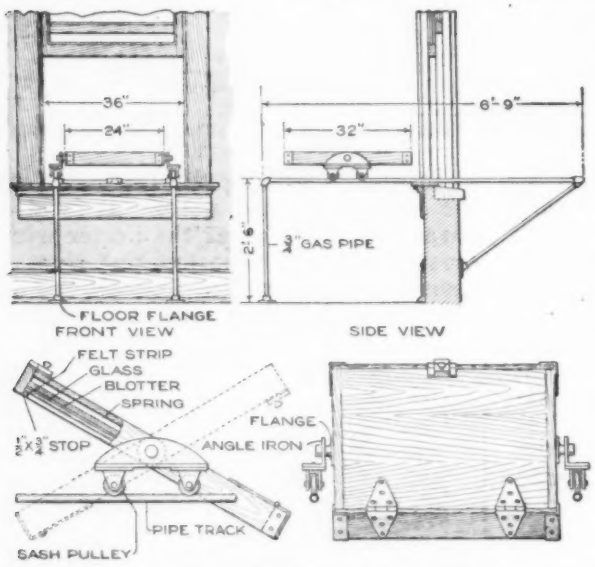
Details of the Double Coil Construction of the Heating Unit: The Passage of the Exhausted Gases is Not Impeded

A small rotary gear pump may be friction-driven from the flywheel to pump water from the heater. If desired, a storage tank, insulated with some heat-retaining material, and provided with an overflow, may be installed.

Such a tank is especially useful for fishing, picnic trips, or other excursions, where the boat would be at anchor for a period. The pump need only be run when water is desired, as the coils are not injured even if they boil dry. Wire controls may be installed to permit governing the operation of the pump from the galley or toilet.

Blueprinting Frame Has Window Carriage and Track

Constant lifting of a large frame in which blueprints are being made may



Being Mounted on Rollers, the Frame is Moved with a Minimum of Lifting. It May Also be Tilted to Obtain the Best Sunlight

be avoided by the use of a window-frame carriage and track, as shown in the illustration. With such a device the largest blueprints require little exertion in handling. The track is formed from several lengths of ¾-in. iron pipe. The rollers for the carriage are made from sash pulleys, mounted like the wheels of a railroad truck. The frame should be made from clear pine, or spruce, boards and fastened with wood screws.

Improvised Veining Tool

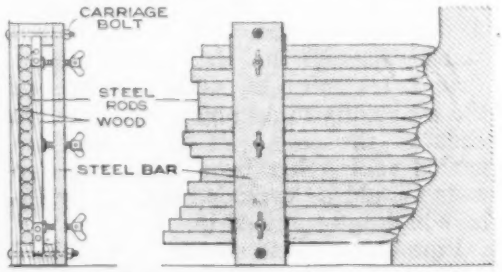
Emergency veining tools that will give satisfactory service for some length of time may be made from old umbrella ribs or steel writing pens. The parts are cut to the required length and inserted in a wooden handle. If the nature of the work demands it, the points may be sharpened or flattened as needed.—Albert Blaine, Baltimore, Maryland.

An Improvement for Electric Bells Having Small Transformers

In electric-bell installations, dry cells are being superseded to a considerable extent by small transformers. This source of power is usually stronger than a battery current. For this reason the contacts are likely to occasion trouble, a particularly important consideration in view of the almost prohibitive cost of platinum. Ordinarily, there is no need for a loud signal, and in offices, and similar places, a quiet buzzer is desirable. Under these conditions the make-and-break system of contacts was disconnected, and the magnetic coils connected directly with the circuit. As the transformer current is of the alternating type, a good signal is obtained by adjusting the vibrating armature closely at the screw contact. When so arranged, a vibration of 120 per second is obtained on the 60-cycle current. Contact troubles are almost eliminated. — John D. Adams, Phoenix, Ariz.

Homemade Gauge for Irregular Curves

Planing irregular surfaces may be accurately accomplished by the use of a gauge, as indicated in the sketch. The dimensions of this tool are determined entirely by the character of the work in connection with which it is to be used. Cold-rolled, or any other grade



The Most Irregular Surfaces are Accurately Measured by This Gauge

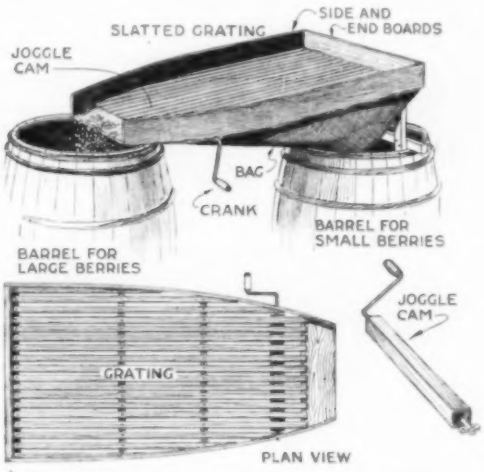
of steel, soft enough to be easily worked, is most suitable for its construction.

Old Cistern Remodeled as Storage Space

In one corner of a basement was a large cemented cistern, and as it was not used for its original purpose, the owner decided to make some other use of it. The cistern was cleaned out thoroughly, and a door opening was cut into it. A frame and door was fitted into the opening, and an electric light installed. The space was used as a storage for fuel, and proved quite practical.

Sorting Hopper for Berries and Small Vegetables

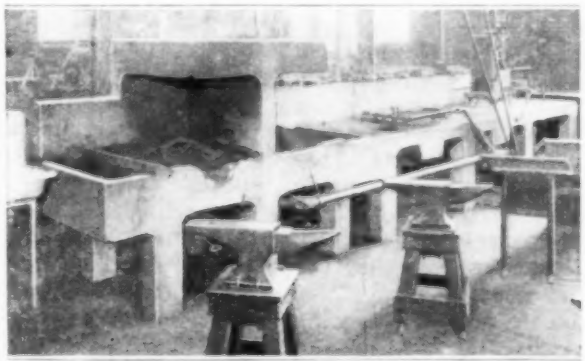
Berries and small vegetables bring highest market prices when sorted according to quality and size. Ordinarily this is done by hand. A sorting hopper of the design illustrated saves much tedious work and sorts the product satisfactorily. The frame is built the same as an ordinary screen, the back and sides being of 8-in. boards. It should be about 3 ft. wide at the large end, and tapered to 15 in. This forms a frame somewhat the shape of a crude rowboat. The joggle cam should be made of hard wood, while the slatted bottom may be of any material available. The distance between the slats is determined by the product to be sifted. Turning the crank rapidly vibrates the slatted section up and down, separating the large and small fruits and running them into different barrels.—L. B. Robbins, Harwich, Massachusetts.



Work That would Keep Several Persons Busy for Hours is Accomplished in a Few Minutes by the Machine

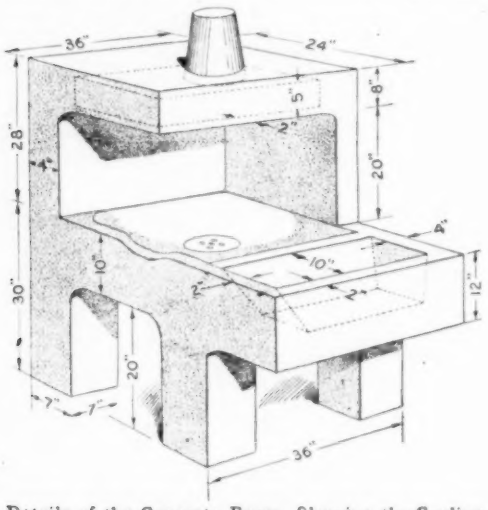
Forge of Concrete for Single or Multiple Use

One of the most recent uses of concrete is in the making of blacksmiths' forges. The multiple arrangement pictured has been in service for more than a year and has proved entirely satisfactory. A mixture of four parts gravel, two parts cement, and two of sand was used. The forms for the legs and hearth were built first. That for the hearth was built onto the leg forms, and the form for the hood was built onto the hearth form. The top of the forms of the hood and hearth was left open in each case to permit pouring and troweling. The



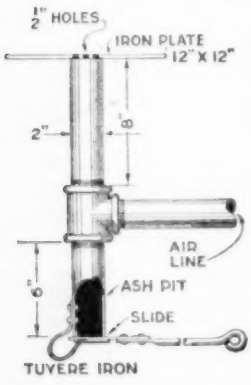
The Shop Equipped with Multiple Forges of Concrete Presents an Appearance of Neatness Heretofore Unobtainable

center of the hearth is left about 4 in. lower than the edges. The form for the trough should be fastened together



Details of the Concrete Forge, Showing the Cooling Trough and Method of Installing the Flue Attachment

very lightly and held in position by several strips across the hearth form. A galvanized-iron bucket is set in the hood to form the base of the smoke-stack. The bottom of the bucket is removed after the pouring. A tuyère iron may be bought, or one made after the fashion of that shown in the sketch. Whatever type is used, it should be placed in position in the form and the concrete run around it after provision has been made for holding it in place.



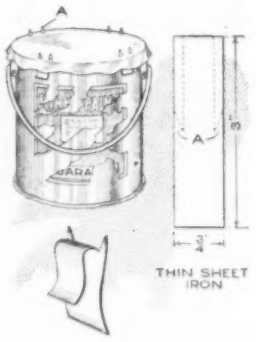
After the form is all complete the iron reinforcement is put in place. This may be made from old scrap iron, such as wagon tires or round rod. Care should be taken to see that the reinforcements connect properly. No provision need be made for expansion and contraction caused by heating and cooling. This is taken care of automatically.—Ray F. Kuns, Cincinnati, Ohio.

Pipe Aids in Removing Armature of Motor

To remove a heavy armature from a motor frame is usually an awkward job, even for two mechanics. When the central shaft is drawn through the frame and past the poles, the reach of the man at the rear end becomes short, and the dropping of the armature may result in serious damage. To carry the armature through easily, arrange a pile of blocks on the bearing base, at the side of the frame toward which the armature is drawn. Slip a 4-ft. section of pipe, fitting fairly closely, over the shaft at the rear end. This enables the workmen to get a good grip, and to remove the armature with a single lift.

Clips for Holding Straining Cloth over Can or Container

The job of straining paints, whitewash, or other liquids in the workshop, or even in the kitchen, is usually troublesome when a cloth strainer is used, because of the difficulty in holding or fastening the cloth. By the use of small sheet-iron clips made from strips of metal, shaped and bent as shown, the straining cloth can be held neatly over the top of the container. The clips are set over the edge of the vessel, and the cloth stretched as taut as desired, and pressed down so that the points A project slightly. A good feature is the ease with which the clips can be fitted to various cans and other containers.—Bert Waychoff, Fort Collins, Colo.



¶When a split bearing will serve the same purpose as well, do not use solid bearings in machines.

An Automatic Weighing Machine Electrically Operated

By K. M. COGGESHALL

AN automatic weighing machine has a large range of usefulness, and anyone of fair mechanical ability may construct such an apparatus to meet his particular requirements. The device illustrated is suited to every need and capacity, since the principle of operation remains the same. Grain dealers will find in it a rapid method of measuring grain; on a smaller scale the retail store can easily weigh out a hundred sacks of sugar or coffee for the stock supply in a few minutes, while even shops and factories will find in it many applications.

The mechanism consists of an electrically controlled drop trap and an electric switch operated by a scale balance. Two vertical runways for the door, as shown in the sketch, should be built at the mouth of the chute from the supply bin. These runways must be absolutely parallel so that the door will slide up and down them with minimum friction. A catch, B, should be cut from a strip of ¼-in. sheet iron and then screwed to the top of the door in the position shown. A knob, K, may be fastened to the door if desired, to aid in lifting it.

The pivoted lever A should be made of soft sheet iron, at least ¼ in. thick. The layout of this part is shown in the detail sketch. It may be cut out with a hacksaw, or cold chisel, and finished with a file. The square end is then bent on the dotted line, as shown, so that the flap may act as an armature for the magnet. A hole is drilled in the middle of the lower half of the lever A for a pivot. The armature should then be placed in such a position on the bin that the catch on the door C will engage the catch on the lever. A spring helps hold the armature in position.

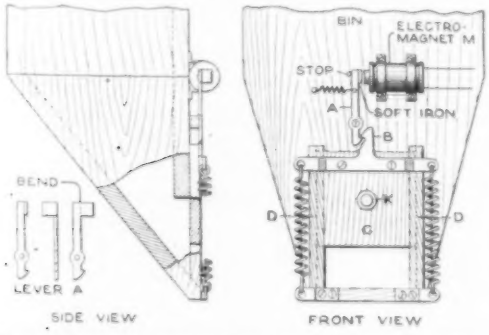
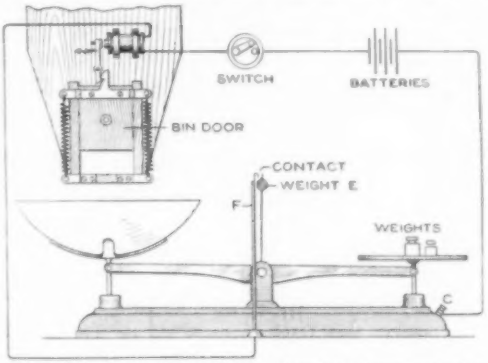


Diagram Showing Wiring and Details of Construction of the Electrically Operated Weighing Machine: The Point of Electrical Contact may be Adjusted to Any Designated Weight



The Supply of Material is Checked Automatically Whenever the Balance Exceeds the Specified Weight for Which the Scale is Set. The Springs Close the Door When the Electrical Contact Releases the Latch

An electromagnet should be wound with No. 18 gauge magnet wire. The size of this magnet will, of course, depend on the conditions and weight of the door drop, but after a few trials the correct number of turns of wire will be easily ascertained. The magnet should be secured in such a position that its core will be opposite, and within 3/32 in. of, the armature, as shown in the sketch. It will then be seen that, if a current of electricity passes through the coil on the magnet, the armature will be attracted, releasing the catch B so that the springs D pull the door shut.

The electric current is controlled by a scale switch. For small weighing machines, a balance scale may be used, as shown in the sketch. A lead ball, or other heavy weight, should be fastened to the upright index finger E, so that the balance action will be snappy. Next, a metal standard, F, should be fastened to a wooden base insulated from the scale. A wire should project from near the top of the standard and across the path of the index pointer. It must be adjusted so that the index pointer will touch the wire immediately

after arriving at the neutral point. Electrical connection should be made from the scale and standard, through batteries, to the electromagnet.

The operation of the weighing machine is quite simple. For instance, if it is desired to weigh up a number of 10-lb. sacks of sugar, a 10-lb. weight would be put on one scale pan. The other pan being directly below the bin door, the latter is opened until the catches engage. The instant the sugar balances the weight, the index pointer will make connection with the wire on the standard, and the door will drop, shutting off the supply of sugar.

Signs on Idle Machinery Give Reasons for Delay in Production

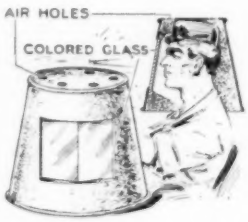
Where there are a large number of machines in a department it is not an easy matter for the foreman to keep in mind the exact reason why any one machine is idle. An idle machine means a decrease in production and a consequent lowering of efficiency of that department. A factory has adopted the method indicated by the drawing, of placarding all machines, whenever shut down, with the reason for the delay in production. The signs are of metal, 8 in. long and 4 in. wide. If the material has been used up a "Stock" sign is placed on the machine. Other signs read, "Repairs," "Tools," "Operator," or as the circumstances may be. The superintendent, walking through the department, notes the signs and immediately takes the necessary action to put the machine bearing such a sign in operation.

Protecting the Hands from Dirt and Grease on Engine Work

By applying soap to the hands before beginning work on an automobile, or other piece of machinery, the dirt and grease are easily removed. Work up a good soap lather on the hands and as far up on the arms as thought necessary. Allow the soap suds to dry. Then scratch the cake of soap with the finger nails, so that the soap is packed tightly under the ends of the nails, and allow it to dry. The hands are protected by a film of soap that will not be removed easily unless they come in contact with water. When the work is finished the dirt can be washed off with very little scrubbing. This method is particularly good for those who do not care to wear gloves when working on machinery.

Welding Mask Made from a Metal Bucket

A serviceable welding mask may be made in a few minutes from an ordinary metal bucket. One of 3-gal. capacity is the best size. A rectangular hole, 6 in. by 4 in. is cut in its side, as shown. Over the hole two pieces of colored glass, each 3½ in. by 4½ in., are placed, so that the long edges will meet at the vertical center line of the hole. The two pieces should form an obtuse angle with each other so as to conform as nearly as possible to the curvature of the pail. The glasses are held in place by metal clips soldered inside the bucket. Several holes should be drilled in the bottom for ventilation. A hat, or cap, is worn to act as a pad for the head, the bucket being worn inverted and in such a position that the operator looks through the colored glass while welding.



¶In washing photographic prints, care should be taken that they are not creased, or the surface may be cracked.

Novel Repair for Cracked Water Jacket on Engine

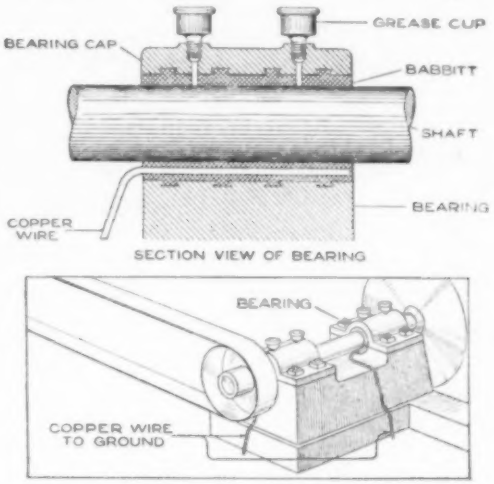
A cracked water jacket may be repaired satisfactorily as follows: Drill and tap a small hole at the end of the crack. Thread in a copper wire, or rod, and cut it off flush. Next drill another hole beside the first one, and close enough to it, so that the threads of the plug, screwed into it, will lap into the first plug. This process is repeated until the crack is filled. The heads of the plugs are then riveted, to close the small intervening spaces. With careful workmanship, this method will provide a water-tight repair that will give indefinite service.—Anthony Ottis, Bloomington, Ill.

Cements for Pipe Joints

Cement for making screw joints in pipes steam-tight may be made from graphite and heavy cylinder oil. Just enough oil is mixed with the graphite to form a thick paste. A good cement for both water and steam pipes has this composition: Whiting, 4 lb.; fine yellow ocher, 10 lb.; ground litharge, 4 lb., and ½ lb. of hemp cut into fine particles. These ingredients are mixed thoroughly with linseed oil to form a paste, which is applied on the threads of the pipes and fittings. For ammonia piping, a cement made of litharge and glycerin is used. Sufficient glycerin is added to the litharge to form a putty. Only enough of this cement should be mixed to serve immediate needs, as it sets quickly. After having once set, it should not be disturbed.

Cooling Large Bearings with Grounded Copper Wires

Large bronze, or babbitt, bearings are effectively reduced in temperature, and static electricity is abolished, by connecting a large copper wire from the bearing to the ground. The heat is radiated over the wire and much of it is lost in the air. That which reaches the ground is absorbed. If the ground wire is placed in moist earth, cooling is all the more effective. The larger

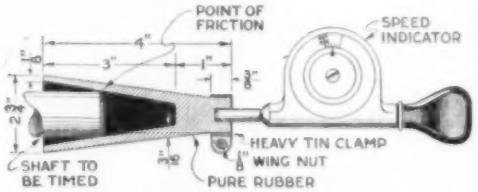


Heat Created by Friction and Static Electricity is Radiated from the Bearing by a Large Copper Wire

the diameter of the ground wire used, the faster will be the radiation of heat.

Attachment Adapts Tachometer for Shafts without End Centers

Ascertaining the correct speed of a shaft that has no end center to accommodate the speed indicator is almost impossible without registering more or less slippage. To overcome this difficulty I turned a piece of pure gum rubber to the shape of a cone, 2¾ in. in diameter at the larger end and 4 in. long. I then hollowed out the latter end and fastened the small end to the shaft of the speed indicator with a tin clamp and wing nut. To determine the speed of a shaft the cone is pressed

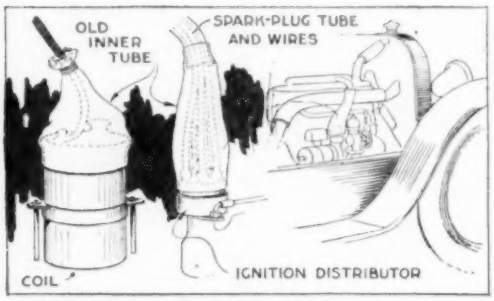


The Rubber Cone Grips the Shaft Securely and Eliminates Slippage

over the end until it holds without slipping. The cone will fit any shaft from ½ in. to 2½ in.—P. P. Avery, Garfield, New Jersey.

Rubber Tube Protects Ignition Distributor of Auto Engine

When motoring in heavy rains, or where streams must be forded, the



The Distributor and Terminal Wires are Protected against Moisture by a Section of an Old Inner Tube

ignition of a car is frequently put out of commission by water getting under the engine bonnet and drenching the distributor. This difficulty may be avoided and the motor fully protected against short-circuiting, from anything short of an actual immersion in water, by capping the distributor with a piece of old inner tube, as indicated. The wires are removed while the rubber is stretched over the distributor and the end of the ignition manifold. Once in place and tied securely, all moisture is excluded.

Machine Nuts Set on Rods with Belting as Wrench

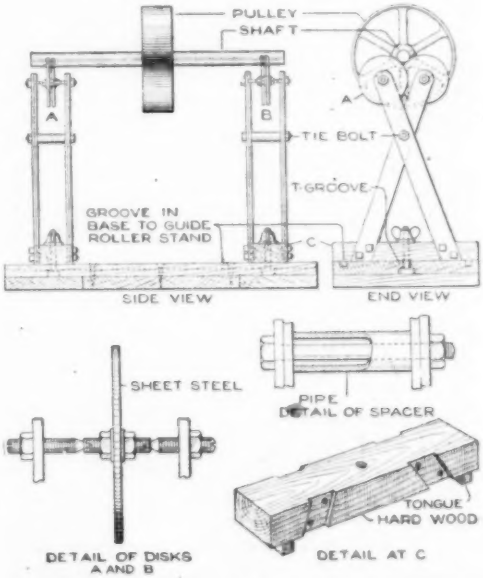
A large stock of iron rods, with threaded sections at each end, were to be fitted with two nuts at each threaded part. The nuts were to be turned down firmly preparatory to shipping the rods. To save time, I started the nuts on the threads by hand, and then set them quickly by the use of an old piece of belting, 3 ft. long. The rod was gripped in a vise, and the belting looped over the nuts near one end of it. By drawing the belting quickly around the nuts they were turned up snugly with a single motion of the belting. To have done this work with a wrench would have taken much more time.—H. G. Corbin, St. Paul, Minn.

Micrometer Used as Indicator on Work in Chuck

A micrometer can often be used to true up finished work in the lathe chuck when an indicator is not at hand. Open the jaws of the micrometer part way and clamp the frame to the tool rest with blocks of wood. Run the carriage in until the end of the micrometer handle is near the work. Slowly revolve the chuck by hand, frequently setting the handle against the work, and observe the reading to determine the eccentricity of the piece. When the reading is the same at various points on the circumference of the piece, it is centered. This method can also be used in setting up work in a milling machine or shaper.—H. H. Raymond, Newburyport, Mass.

Disk-Bearing Stand for Balancing Rotary Machine Parts

Balancing flywheels, pulleys, and similar parts, is simplified by the use of a disk-bearing stand, as illustrated. The disk-bearing surface allows the part to rotate with so little friction that the heavy portion to be trued

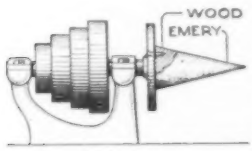


The Parts to be Balanced Rotate without Friction, Sending the Heaviest Portion to the Bottom

immediately goes to the bottom. Material is then removed from the heavy side until an accurate balance is obtained. The disk rollers are carried on conical bearings, supported by a steel framework mounted on a base of well-seasoned hard wood. The distance between the disk rollers is adjustable for accommodation to various lengths of shafts.

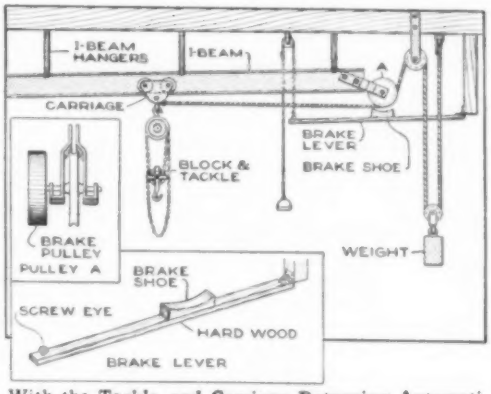
Revolving Cone for Sharpening All Sizes of Gouges

Cone-shaped emery wheels are not always provided, even in pattern or cabinet shops, and frequently I have been at a loss for a means of sharpening various sizes of gouges. Accordingly I have improvised a satisfactory cone-grinding tool from wood, glue, and emery. I screwed a piece of maple to a small faceplate and turned it down to a cone, 3 in. in diameter at the large end, and 6½ in. long. A coat of cold glue was then applied to the cone, and after being allowed to dry for a few minutes, it was sprinkled with medium emery. Once the glue was dry the device worked quite as well as a cone-shaped emery wheel. Several such cones were made up and sprinkled with different grades of emery to suit various grinding jobs. When the cutting surface is worn out, it is only necessary to resurface the cone by the application of more glue and emery. The size of the cone may be altered to suit requirements.—R. L. Martine, Shelton, Connecticut.



Counterweight Returns Block and Tackle to Loading Point

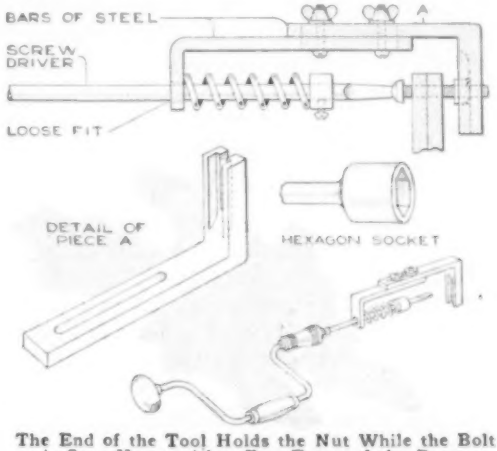
Where loads are carried one way on an incline track with a block and tackle on a carriage, the entire mechanism may be returned to the loading point automatically by a cable and counterweight, connected as shown in the illustration. The weight should be just heavy enough to return the empty carriage. The brake is provided to check the speed of the loaded tackle and carriage as may be desired.



With the Tackle and Carriage Returning Automatically When Unloaded, Work is Accomplished Rapidly

Device for Tightening Bolts Quickly with Brace

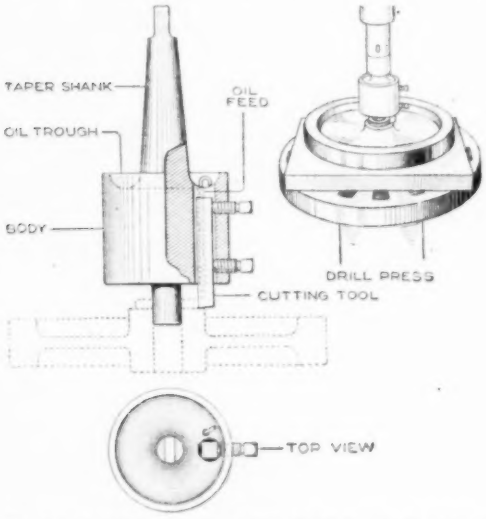
In assembling stoves and many other varieties of work where large numbers of small bolts are used a brace-attachment tool as indicated in the sketch is a great saver of time and labor. It is only necessary to start the bolts with the fingers, after which they are held and tightened practically by a single operation of the tool. A hexagon socket to be inserted in the brace permits the same application with head-cap screws.



The End of the Tool Holds the Nut While the Bolt is Sent Home with a Few Turns of the Brace

Tool for Machining Bosses and Hubs on Drill Press

Bosses and hubs for all manner of light machinery may be machined on a



Equipped with This Tool, the Drill Press Machines Bosses and Hubs Accurately

drill press by the adoption of a taper-shank cutting tool as shown in the illustration. Best results are accomplished in this work if the press is operated at its lowest speed. For machining bronze, aluminum, or soft castings, no oil is needed, but for any work harder than the best grades of gray iron a continuous oil bath through the top of the tool is essential to retaining a keen edge.

Carpet Pad for Wood Planes Saves Frequent Sharpening

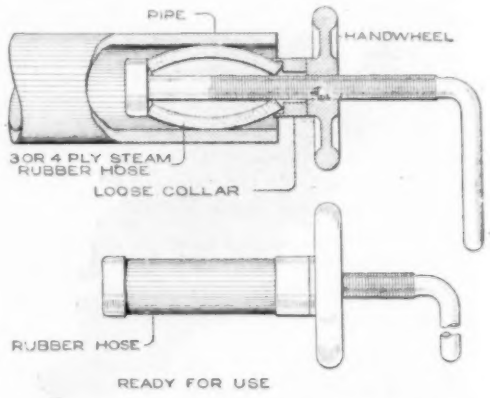
The home woodworker, who has not trained himself to be especially careful of his edge tools, finds his planes nick quickly. This is often caused by laying the plane hurriedly on the bench among other tools. A plan that will save much resharpening, and will keep the edge on the plane, is to provide a ⅞-in. board, about 10 in. wide and 14 in. long, covered with a carpet pad, on which the plane can be set. This pad may be on the bench top, or arranged as a shelf.—S. C. Lange, Detroit, Mich.

Removing Old Babbitt Metal from Bearing Boxes

Usually most of the babbitt metal can be removed from a bearing box with a cold chisel and hammer. If this procedure is not feasible, the box may be placed in a forge fire, and the babbitt melted out. The melting method is undesirable because of the probability of losing part of the metal. Where the bearing box is small the metal may sometimes be melted by the use of a blowtorch, and permitted to drop from the box into a suitable tray arranged underneath.—L. S. Sherman, Chicago, Ill.

Device for Plugging Ends of Pipes under Pressure Tests

In testing pipes, or tubing, for leaks with either water or air pressure, an end plug that may be applied or removed almost instantly is desirable. Such a plug, with a piece of steam hose as the stoppage member, may be fashioned by using the threaded combination indicated in the sketch. After being inserted in the pipe the hose is expanded with a few turns of the handle.



A Couple of Turns of the Lever and Handwheel Plugs the Pipe Securely

Once placed, it forms a contact sufficiently tight for normal test pressures.

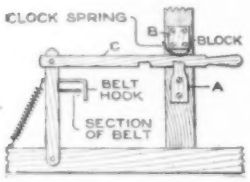
¶Interior corners of patterns are rounded off with fillets because a sharp interior corner in a casting weakens it.

Serial-Number Identifications on Working Drawings Save Time

When there are several drawings on separate sheets made in connection with a drafting job, every sheet should bear the serial number, title, date, and index, or filing, number. The best method is to place this information on the sheet as soon as the work is begun. This simplifies checking up the drawings, and makes it possible to file them so that persons unfamiliar with the drawings or subject can easily locate the sketches of the various features covered by the design, or working drawing.—William B. Johnson, Baltimore, Md.

Simple Belt Shifter with Spring Lock

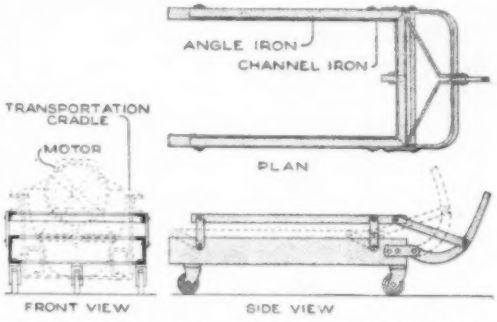
An ordinary belt shifter can be provided with a locking device, to prevent the belt from working back on the loose pulley and stopping the machine, by fitting the shifter with the arrangement shown. The method can be applied to shifters in various positions. The original shift lever is shown with the belt hook attached to it. The handle C is pivoted, with a screw, on the old shifter. An upright is fitted with a block, B, and a key, A. The key fits into notches, about 1 in. wide and ½ in. deep, cut at points slightly farther apart than the width of the belt. A section of clock spring on block B holds the handle against the key A. A spiral spring aids in keeping the belt hook in position over the loose pulley when the lock is not being used, temporarily. The shifting of the belt, and locking it securely is easily accomplished.—Robert B. Binns, Boston, Massachusetts.



¶Polishes intended for brass, or other metal, should not be used on lacquered work, unless the lacquer, which is removed, is replaced by a new coating.

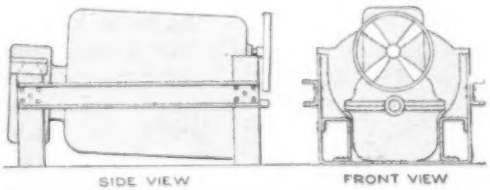
Truck with Lifting Platform and Cradle for Auto Motors

The truck illustrated is designed for use in handling automobile motors in garages and assembling plants. It consists of a main body of channel iron bent into the shape of a large "U." Three casters are set on it, one at the base of the U, and the others at each of the ends. A U-shaped bar is set on four small toggle levers that are fastened to this bar and the main frame. The bar is operated by a long lever attached at one end to the main frame and connected by a free-working lever to the small bar.



The Dotted Lines Indicate the Functioning of the Lifting Platform. The Plan View Shows Structural Details

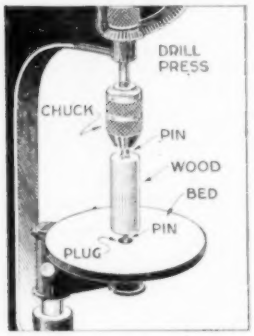
To operate the truck it is slid under the engine-cradle side channels. Then by pulling down on the long lever the small U-bar is raised on the toggle and lifts the cradle. The linkage is so arranged that it holds the weight up while the truck is wheeled about by the same handle that raised it. In the sketch the truck is shown with the U-bar raised. The dotted lines in the two upper sketches indicate the position the platform takes when raised and lowered.



With This Truck Automobile Motors are Installed or Removed with a Minimum of Effort

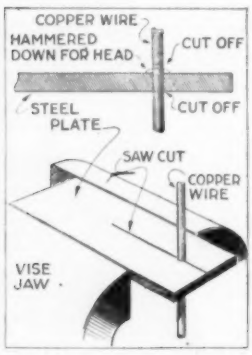
Using the Drill Press as a Wood-Turning Lathe

In shops unprovided with facilities for turning wood, there is frequently demand for work requiring a fairly accurate cylindrical outline. Such work may be turned out on a drill press. Two stout pins are driven in the ends as nearly in the center as possible. One of the pins is secured in the chuck while the lower one is given a bearing in one of the holes of the drill table. A suitable tool rest is provided by an ordinary machine clamp, while an old bastard file, ground off, sharpened, and provided with a handle, makes a satisfactory cutting tool. The size of work that may be turned out in this manner is limited only by the size and adjustments of the drill press. —J. S. Hagans, Toledo, Ohio.



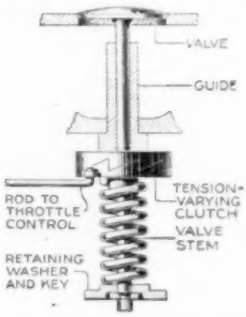
Method of Making Copper Rivets from Annealed Wire

After finding it impossible to make good copper rivets in a vise, I contrived the method illustrated in the sketch. In a piece of steel, about ¼ in. thick, a hole is drilled, the size of the stock from which the rivets are to be made. A single cut should then be made with a hacksaw from the end of the piece of steel to a point an inch or more beyond the hole. When the steel is put in a vise it tightens up on the stock inserted in the hole, holding it firmly while the top of the rivet is headed down and the other end cut off. Rivets of uniform size and of any desired length may be made by making a form of the required dimensions.—Melvin Snyder, Duluth, Minnesota.



Adjustable Valve-Spring Tension Adapts Motorcycle for High Speed

Powerful exhaust-valve springs are essential when high speed is demanded of a motorcycle, but such springs make the motor difficult to start and unsatisfactory when throttled down. By providing his machine with a ratchet tension-varying clutch, as illustrated, a motorcyclist has secured a compromise between the touring and high-speed types of mount. The ratchet is connected with the throttle control so that, as the speed of the motor is increased, the tension of the exhaust-valve springs is increased by compressing them slightly.—E. F. Hallock, Brooklyn, N. Y.

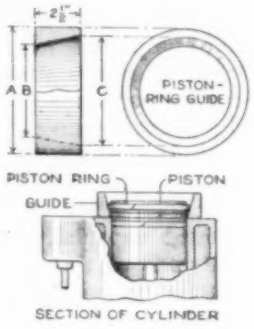


Cement Mixture for Patching Dents in Boat Hulls

Red lead and Portland cement mixed, half and half, with oil to a putty consistency, form an excellent patching material for holes, up to the size of a silver dollar, in boat bottoms. The edge of the hole should be dry, rough, and pegged with small galvanized nails projecting slightly to reinforce the cement. The patch hardens slowly, hence it is best to do this work in winter, or while the boat is out of commission. For a quick repair, cement and water is fairly satisfactory. It is then unnecessary to have the wood dry and the boat can be used, without danger to the patch, in about two days.—Hayes Bigelow, Brattleboro, Vt.

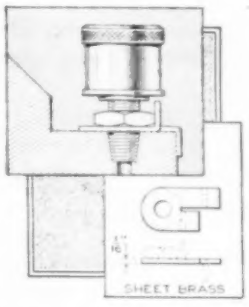
Guide for Inserting Piston Rings in Cylinders

By the use of a steel guide having a tapered hole, the task of setting pistons in cylinders is simplified. The inside diameter of the guide, at the small end of the taper, should be exactly the same as the bore of the cylinder. The upper inside diameter should be slightly larger than the piston measurements over the rings when expanded. The guide is placed over the cylinder and the piston pressed down through the taper which compresses the rings and allows them to slide into place. A coating of heavy oil over the piston and the inside of the guide aids in the smooth accomplishment of the purpose.



Holding a Loose Grease Cup on a Clutch

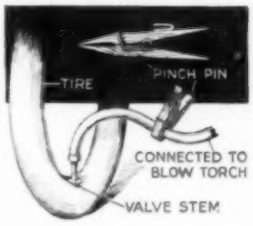
A loose grease cup on the clutch of an automobile was the source of much trouble, three cups being lost before the device shown was used to prevent it from coming loose. A strip of 1/16-in. sheet brass was inserted beneath the locknut, one end being bent up against the nut and the other against the edge of the clutch housing. The strip served as a positive lock for the nut, and the grease cup never came loose thereafter.



¶It is usually necessary to drill out a broken stud; hence bolts should be used wherever practicable.

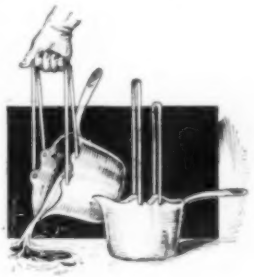
Tire Used to Furnish Pressure for a Soldering Torch

When the air pump of a garage man's soldering torch failed just as he was about to begin an important piece of work he substituted an inner tube to supply the necessary air pressure. It rendered satisfactory service. The spring mechanism was removed from the valve stem, after which the tube was pumped up. A pinch pin was used to hold the air between the strokes of the pump and to retain it after filling. The end of the air hose was then connected to the pressure cock of the torch and the air released by the removal of the pinch pin.



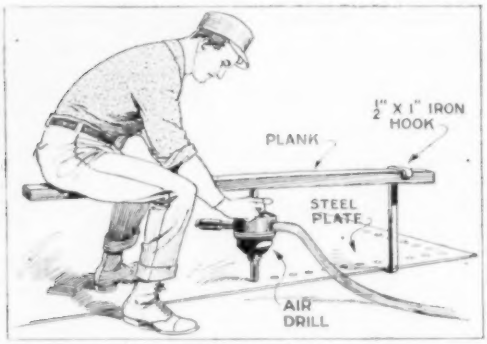
Caldron Pours Molten Metal with One Hand

Pouring molten lead, or other metal, in cramped quarters, such as pipe and electrical conduits, is decidedly awkward and even dangerous if both hands have to be used at the task. Much of this difficulty may be eliminated by the use of a double-handled caldron as illustrated. An ordinary melting ladle may be so altered. Round iron, 1/4 in. in diameter, is used for the handles. The front one is so placed that the caldron will balance when picked up by it. The rear handle is 2 1/2 in. shorter and is set 2 in. back of the other. By tightening the grip on the two bails, the caldron is tilted and the contents poured. The usual handle is left in place for use where two-handed work is convenient.—S. L. Heaps, Kewanee, Ill.



Rigging Lessens Work of Drilling Holes in Steel Plates

When drilling rivet holes in large plates of steel that cannot be handled



This Advantageous Method of Drilling Holes in Steel Plates Saves the Time Usually Lost in Using a Clamp and Hand Screw

in a press, the work is facilitated by using a hook, made by bending a ½ by 1-in. flat bar, and a short plank. By placing the members as shown in the illustration, and sitting on the free end of the board, an air or electric drill is held in place under sufficient pressure to drive it through the metal. The plan eliminates the trouble attending the customary practice of placing the drill under a clamp and feeding it through the plate with the aid of a hand screw.

Machines Oiled at Close of Workday Start Easily in Cold

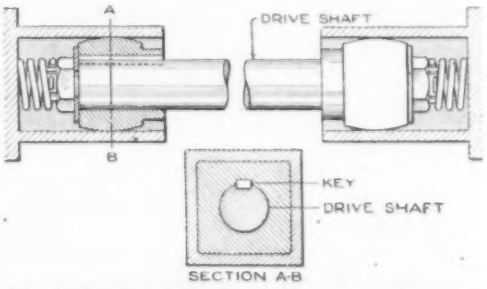
When running machinery in cold weather even hot oil, put on before starting, sometimes cools in the oil passages and does not flow to the bearing surfaces until undue friction warms the bearing enough to soften it. To overcome this difficulty, oil the machinery immediately after shutting down at night. The bearings being slightly warm, the oil gets to the bearing surfaces, and is ready for the start next morning, when more oil can be put on if required. This obviates the danger of getting the bearings too warm before the oil becomes heated enough to flow readily.—J. E. McCormack, Haliburton, Ont., Can.

Pipe Cutter Used to Strip Heavy Covered Cable

Having considerable weatherproof cable to cut and prepare for receiving terminals, I encountered great difficulty in removing the insulation. The hacksaw, and other tools, quickly became gummed with the weatherproofing compound. By the use of a three-wheeled pipe cutter, such as plumbers commonly employ, I was able to sever the covering quickly and smoothly. A neat groove for the hacksaw was provided, and the conductor was cut quickly with a clean saw. The cutter proved especially useful in preparing the ends of the conductor for the terminals, providing a square, clean-cut shoulder.—A. Vaughan Simpson, Niagara Falls, N. Y.

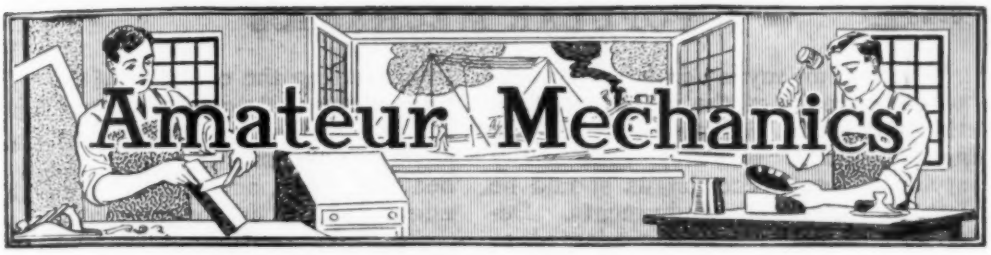
Spring End Bearings Overcome Play in Auto Drive Shaft

The drive shaft on an automobile was provided with universal joints that permitted a free lengthwise motion of the shaft, this occurring when the car was fully loaded. After a little while the inner portion of the joint housing became slightly worn, and it was not long before the shaft was sliding back and forth continuously. A spring was placed, at each end of the shaft, as shown in the sketch, and this solved the problem. The shaft thus continually



The Automobile Drive Shaft Floats between the Coil Springs at Its Ends

floats between the two springs, and the rear-joint housing is the only part that moves when the car is loaded. Vibration is wholly eliminated.



Rowboat Easily Converted for Cruising

By L. B. ROBBINS

IF one has a sound flat-bottomed rowboat he need not feel envious of the millionaire with his palatial yacht or houseboat. A few boards, a little hardware, some canvas, and simple carpenter work will convert the skiff into a craft suitable for extended cruises on placid waterways. Meals may be prepared on board, and, if the craft is a fairly roomy one, comfortable sleeping quarters for two persons can be arranged. A small storage battery should be carried to provide light.

The power plant is optional with the owner. A standard "outboard" motor is probably the ideal outfit, but there

The Sketches Indicate the Alterations Essential to Converting the Boat for Cruising. The Drawing Shows the Completed Boat with the Cover Drawn Back to Show the Interior

are other makes of motors that will take up little room. Oars may be resorted to, if mechanical propulsion is unavailable. Regardless of the type of power plant used, a pair of short oars should be provided for use in an emergency.

The accompanying drawings are explanatory only of the arrangement of things and do not give any definite measurements, because, with many styles of boats, the details should be left to individual requirements. Details, however, are easily adapted to the boat possessed, and alterations to suit requirements do not necessarily demand a radical change of plans.

The stern seat should be removed and the cleats holding it lowered, so it is located three thicknesses below its original height. A front panel is then fitted in and the seams treated with white lead to form a water-tight box. The seat becomes the top and is hinged at the rear edge and fitted with a couple of finger holes near the front. This makes a dry locker for articles that dampness would injure.

Two panels, the shape of the rowing seat, are sawed out. They should be a trifle smaller so they will not bind against the sides of the boat. These should be small enough to be cleated at each end to prevent warping. The narrow edges of the two panels are hinged with strap hinges, and the longest edge of the one to the rear is hinged to the edge of the stern seat so they will fold, as shown in the sketch. When folded they form a seat the height of the original one. Two wooden sockets are screwed to the inside of the boat to hold a crosspiece which supports the panels at their junction, as illustrated. The rowing seat should then be lowered to one thickness below its original height. The swinging panel may then be cut in the shape shown, so it will conform to the angle of the bow when swung forward. The two wings are hinged to each end to fill the spaces between the ends and the boat sides. When this panel is swung into place the wings drop down out of the way. Two angle braces support the forward edge of the rear panel on a level with the rowing seat. A cleat on the first bulkhead holds the swinging section of the second panel at the required level. Another bulkhead near the stem will leave a small well which accommodates the anchor and rope and prevents them from wetting the contents of the boat. The space between the two bulkheads may then be fitted with a tight cover. This affords a place to keep bedding, food, and other things that might get wet in rough weather.

At night the hinge seats are unfolded, and the bedding spread in place on the resulting platform. Pneumatic mattresses are admirably suited to such use. For a nominal sum a blacksmith will make a pair of irons like those indicated in the cover-frame sketch. The shorter one fits in sockets at the stern and the larger one about a third of the distance back from the bow, according to the arrangement illustrated. A hole is drilled through the peak of each iron and a small woven-wire cable secured to it. The stern iron should be raised first, and then the forward one, after which the wire is drawn taut and its end secured to a screw eye in the stem of the boat. A harness snap hook is the best thing to use there.

The cover should be of fairly heavy, waterproofed canvas. The frame is first assembled, and the canvas fitted over it. Grommets are sewed in about a foot apart along the bottom edge, and a stout cord is run through them which will fasten under small hooks in the gunwale of the boat, to hold the cover taut. One side should be allowed to lap over, as shown, to serve as an entrance and exit. A mosquito door of cheesecloth or bobbinet is essential. This should be carefully fastened all around and provision made for closing it tightly. There are but few waterways that are free from mosquitoes, and without efficient protection against them the most carefully planned camping trip is likely to be a disappointment. When the top is not in use, it is folded across the bow and lashed down.

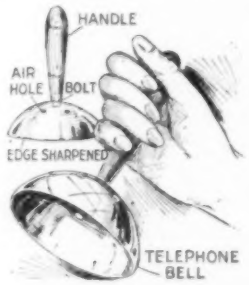
With such an outfit two boys can spend a healthful vacation with practically all the comforts of home. There is almost no end to the possibilities of the trips that may be taken. The only limitation is the amount of time at one's disposal.

Fruit-Jar Funnel Made from a Milk Bottle

A funnel that has a wide range of application about the household, and especially in food-canning season, may be made by cutting the body off an ordinary milk bottle. The bottle is trimmed at the desired point by tying an alcohol-saturated cord around it, and applying a match. The glass will break evenly at that point. After breaking, the edge is smoothed off on an emery wheel, and the funnel is ready for use.—Walter B. Raynor, Patchogue, N. Y.

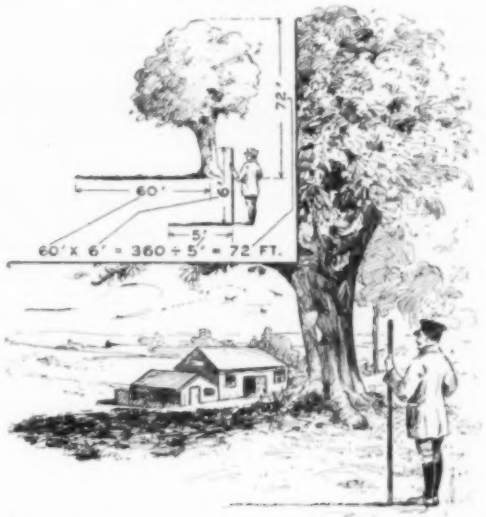
Biscuit Cutter Made from a Telephone Bell

An old telephone bell such as can be picked up in any electrician's junk heap is easily converted into a serviceable biscuit cutter, as shown. Such a cutter will turn out a delicately shaped product. A wooden handle is provided by whittling it from a 5-in. length of broomstick, and is attached to the bell by means of a bolt or screw. Several holes should be drilled near the top to permit the escape of air. After the implement is assembled the edge is sharpened by filing or grinding.



Determining the Height of a Pole or Other Object

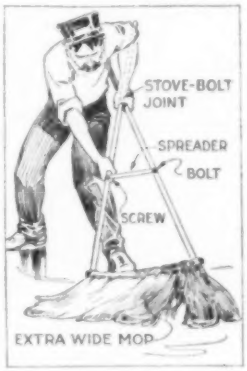
On a sunny day the height of any object may be quickly determined by a comparison of shadow lengths, as illustrated. It is obvious that if a stick 6 ft. long casts a 6-ft. shadow, a tree 60 ft. high would make a 60-ft. shadow. Therefore by using a stick of any known dimension and making a simple mathematical calculation the height of any object is accurately determined. The length of the shadow of the object is multiplied by the length of the stick and divided by the length of the stick's shadow. The resulting figure gives the height of the object.—George Perkins, Milburn, N. J.



By Comparing the Shadow of a Stick of Known Length with the Shadow of a Tree, or Other Object, Its Height may be Determined

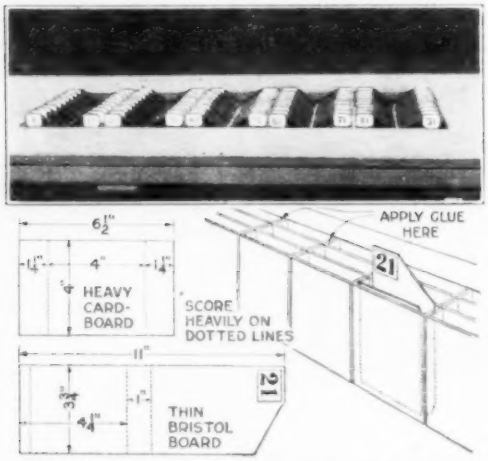
Collapsible Mop Cleans a Wide Path

Realizing that I could work more rapidly with a wide mop I contrived the collapsible implement illustrated. It is 36 in. wide when spread and may be instantly folded for immersion into the bucket. The handles are of 1½ by ⅞-in. oak, and the spreader is of the same material. The spreader is bolted to one handle with a stove bolt and swings either up or down. The free end is fitted with a screw eye that hooks over a screw in the other handle when the mop is spread. Three mops sewed together give the required width.—O. Kresser, Melrose Park, Ill.



Sorting Table for Numbered Cards, Photos, and Parcels

A 100-pocket sorting rack for numbered cards, photographs, small parcels, etc., can be constructed by taking 100 pieces of cardboard and making shallow parallel cuts 1¼ in. from either end, after which the ends are bent at right angles to the body of the cards. By placing these cards side by side, in rows of 10, and gluing adjacent ends, a rack of 100 convenient pockets will be formed. The numbered indexes are made by cutting 100 pieces of Bristol board, as indicated, and bending them U-shaped so that they will fit into the pockets, with the numbered end projecting slightly. These inserted members are a great convenience in lifting small objects from the pockets. In sorting articles numbered above 100 the first digit of the number is disregarded.



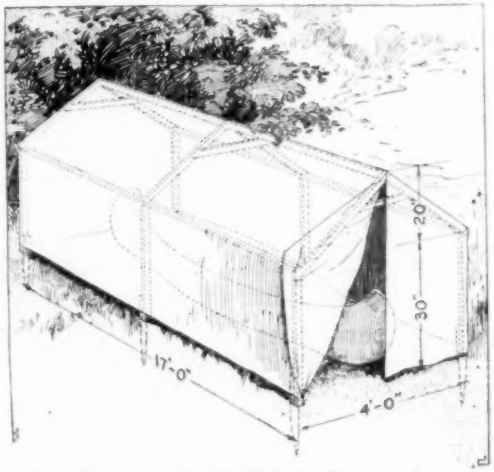
A 100-Pocket Rack Made of Cardboard Units Glued Together, into Which U-Shaped, Numbered Index Signs are Inserted, and Details of Its Construction

Unused Newel Posts Made into Pedestals

Several newel posts were rejected by a contractor, because of slight flaws. The owner of the new home converted the posts into pedestals for the living rooms. The caps and bases were removed, and flat tops and bases substituted. The surfaces were scraped and sandpapered to a good cabinet finish, and the wood filled, stained, and varnished to match the other furniture in the rooms.—Charles T. Hiser, Greenfield, Ohio.

Canvas-Covered Shelter for Canoe or Small Craft

Canoes or small boats are often left at the water's edge, overturned to shed rain, with the result that they are unnecessarily worn or damaged. A form of protection which proved practical is a canvas-covered shelter, built on a wooden frame, as shown in the sketch, and bolted to stakes driven into the ground. The canoe, or boat, is easily placed in the shelter through the open end nearest the water. When it is desired to move the location of the shelter, the bolts are unfastened, and the framework bolted to stakes set at the new location. This is better than building the several frames with stake ends, as the framework is damaged in driving the stake points into the ground, or removing them. Strips of wood, ⅞ by 3 in. wide, are used to make the framework. The parts are nailed together, or joined with screws. The dimensions indicated are for a 16-ft. canoe, and should be varied to suit the craft for which the housing is intended.—D. Van Horn, Milton, Wis.



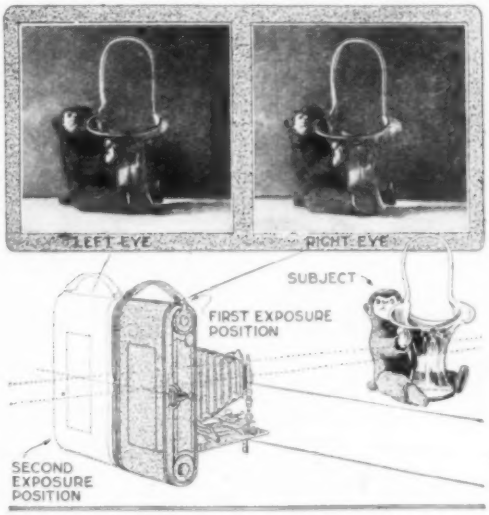
The Canoe or Small Boat is Protected from the Elements by This Portable Shelter Built at the Water's Edge

Stereoscopic Pictures Made with an Ordinary Camera

By A. W. MacMILLAN

STEREOSCOPIC views of still objects may be taken with no apparatus other than an ordinary camera and a table. A camera of any desired size may be used.

Two separate pictures must be taken which will require two plates, or exposures of film. After taking the first or "right-eye" view it is necessary to slide the camera to the left about 3 inches, and then with the same exposure take the "left-eye" view, as indicated in the illustration. When printed, these two pictures will look very much alike, but they are slightly different, and it is this difference which is responsible for the effect of depth and solidity which results when the two images are viewed through the stereoscope. Near objects seem to stand away from far objects in the realistic way that makes the instrument an object of interest.



Two Separate Exposures are Made and Matched as Above. The Camera is Placed for Each Exposure as Illustrated

For mounting, any card which is 7 in. long and 3½ in. wide may be used. The right-eye picture should be mounted on the right-hand side of the card, and the left-eye picture on the left side, so that the left-hand edges of the two are approximately 3 in. apart. All corresponding points in the two pictures must be on lines parallel with the bottom edge of the card and all similar lines parallel with each other.

This condition will be met if the prints are properly trimmed. For this purpose, the right-eye picture should be placed directly over the left-eye print, and the two held before a bright light. The pictures are then moved over each other until the principal object in one is directly over the same object of the other. They are then trimmed off along the bottom line of the two while being held together in register. Thereupon they may be separated and squared to the same size. If a small pocket camera has been used very little trimming will be necessary. If a large camera has been used, any particular portion of the picture may be selected, not necessarily the central portion. The bottom edges of the two prints should rest on the same pencil line which has been drawn parallel with the lower edge of the card.

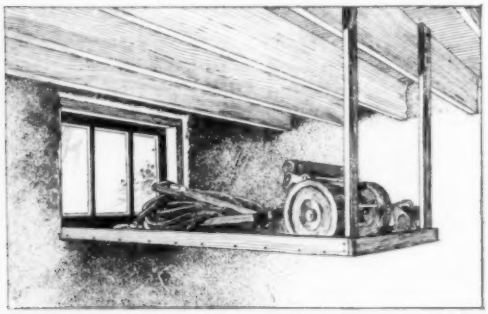
While the two pictures are being taken, the table must not be moved. The slightest vibration of the camera between the exposures may spoil the result. For this reason books, or other objects that may have a slight resiliency, should not be used for supports. A heavy block, or a wooden box, is best if the camera must be raised to focus upon the view. The camera, however, may be turned on the table so that it will point in any direction, without harm. The distance between the right-eye and left-eye positions of the camera may be from 2 in. to 4 in. The greater the distance, within these limits, the greater will be the stereoscopic effect. For the average view and camera, 3 in. is about the correct distance. There must be no movement in any part of the view being taken, between the two exposures.

Pictures taken by this method with a portrait, or copying, lens give exceptionally good results. Interiors are always effective. Objects 10 or 15 ft.

away, when set off against a distant background, show a marked stereoscopic effect. No stereoscopic effect will be noticed if everything in the view is located at a considerable distance.

Lawn Mower and Tool Shelf at Cellar Window

To make his lawn mower and garden tools easy of access, a householder

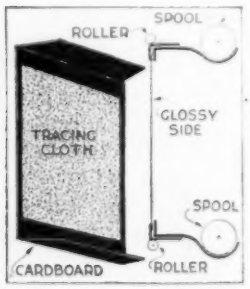


A Shelf Extending from a Cellar-Window Ledge Where Lawn and Garden Tools are Kept so as to Be within Easy Reach from the Outside

built a shelf in his cellar, so situated that he can get at these articles without going indoors. One end of the shelf is suspended from the ceiling beams by two wooden supports and the other rests on the ledge of a cellar window, through which any of the tools may be withdrawn when wanted.

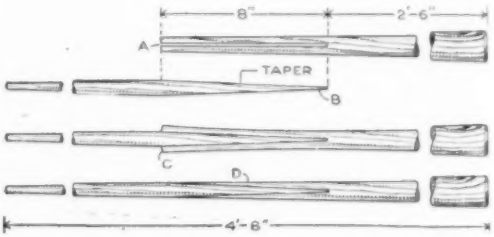
View Finder for Film Camera Made of Tracing Cloth

In using a film camera it is sometimes desirable to take pictures that should be accurately centered on the film. When close up to the object this is difficult with the ordinary view finder. By providing a special finder, like that shown in the sketch, the view can be carefully centered. A piece of tracing cloth is glued smoothly into a cardboard frame, which is slipped into the back of the camera. The film is, of course, not put into place until the desired view is obtained, a tripod or other rigid support being used when possible. The film is slipped into place when the desired view is determined upon, the back of the camera closed, and the picture taken in the usual manner.—Howard Scott, Jersey City, N. J.



Splicing a Broken Billiard Cue

Through trimming for retipping, or through accident, a billiard cue may become too short for good play. With careful work, the original butt, which is often of ornamental wood, may be saved by splicing it to a point section of another cue. To make the splice, cut the cue off 3 ft. from the butt end. With a fine-toothed hand saw cut a slot in the small end, as shown at A, making it 8 in. long. If the point end of another cue is not available, make



The Butt of a Billiard Cue was Saved and Refitted with a Section for the Tip End

a substitute of straight-grained maple, planing it carefully to the desired shape. Form the end of this piece to a taper, as shown at B, smoothing it with a plane. Fit the taper accurately to the slot A, and glue it into place as shown at C. Bind the joint with clamps, and make certain that the cue is straight, before setting the joint finally. Then smooth off the extra wood, and finish the cue to its proper shape, as shown at D. A thoroughly satisfactory cue will be obtained, if the work is carefully done. Cut the cue to the proper length, finish it with shellac, and replace the tip.—George L. Furse, St. Louis, Mo.

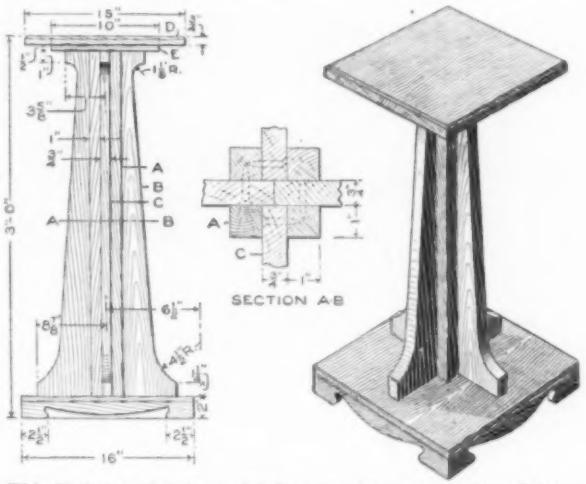
A Practical Poultry House Economically Constructed

A Pedestal for the Home Craftsman

Wood which can be easily shaped into the designs shown, if patterns are made, is used for the pedestal of graceful outline, yet substantial construction, shown in the illustration. Hard wood, ⅞ in. thick, is preferable, although soft wood may be used. The design may be varied somewhat to suit individual taste.

Begin the construction by making the patterns, of strong paper, for the curved pieces. The shape of these pieces can be laid out directly on one of them, and transferred to the others if proper care is taken. Two of the side supports, B and C, are wider than the other two, as shown in the sectional view. The four internal corners of the support are braced by strips, A, 1 in. square. The shaped pieces around the bottom of the base are mitered at the corners. The base is fastened to the support by means of screws from the bottom. A plate, E, 10 in. square, is fastened similarly with screws to the top of the support. The top D is then fastened into place by screws through the piece E.

All of the parts should be planed and scraped to a finish, and then lightly sandpapered before assembling them. Before applying the finish, the surface should again be gone over lightly with sandpaper, and the sharp corners broken away slightly. Various kinds of stain, with filler if necessary, varnish or wax, may be applied if hard wood is used.—G. Bretz, Berwick, Pa.



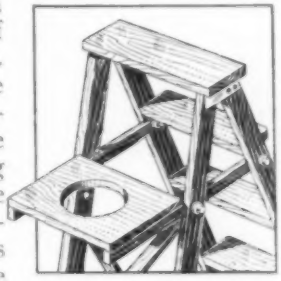
This Pedestal of Substantial Construction and Pleasing Outline can be Made Easily by the Home Woodworker and Finished to Match Other Furniture

Repair for Mouthpiece of Favorite Brier

When on a camping trip, or other outing remote from civilization, the failure of one's pipe, particularly a favorite brier, is almost a catastrophe. Under such circumstances I was perplexed recently when my teeth punctured the well-worn mouthpiece of a beloved old brier. Procuring a length of No. 10 thread, I effected satisfactory emergency repairs by waxing it thoroughly and winding the stem. The winding was started about an inch from the break and drawn up tightly to the end. Three layers of thread covered the hole entirely and the pipe was again fit for service.—R. Duke Brace, Nassau, Bahama Islands.

Stepladder Shelf Fitted with Bucket Holder

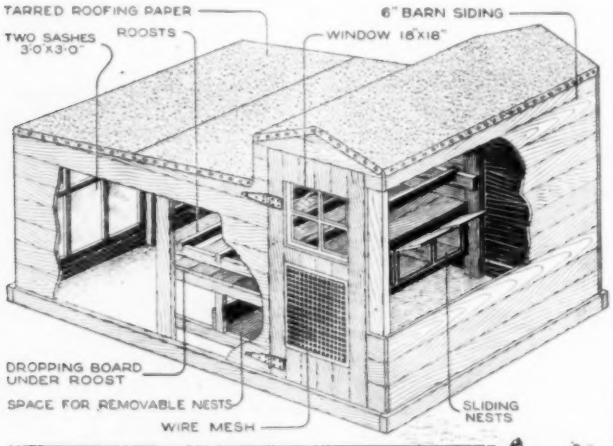
An improvement on a stepladder, of the type having a folding shelf at the back, is to cut a hole in the shelf for the bucket. This avoids the common possibility of the bucket being jarred from the shelf, to the danger of persons below. If the shelf is not strong enough, additional strips may be nailed across it, or a hoop of iron fitted into the hole.—Dr. C. A. Rhoads, Boone, Ia.

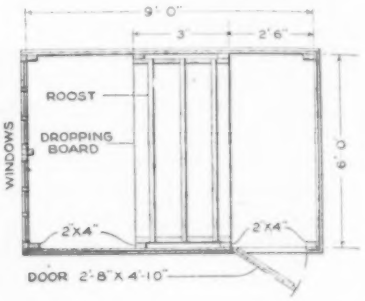


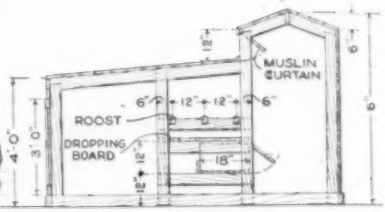
A Practical Poultry House Economically Constructed

By JOHN H. McCARROLL

THE poultry house illustrated is designed to accommodate two dozen hens, and is so simple in its construction that any schoolboy with as few tools as a hammer, saw, and screwdriver, is capable of building it in the few odd hours usually at his disposal.







DETAIL PLAN AND FRONT VIEW OF FRAMEWORK

For All-Year Use in Practically Any Section of the United States This Substantial Yet Economically Constructed Poultry House Has Numerous Advantages: It Is Light and Airy, and with Special Provision for Cleaning, Is Thoroughly Sanitary. The Tools Needed to Build It Are Few and Simple

The materials will cost approximately $18, although, of course, the amount may vary slightly with local market conditions. Ease of construction is not the only desirable feature. The removable roosts and nests make cleaning easy, and the swinging muslin curtain, as shown in the lower front view, provides a means of keeping the house at the proper temperature, and at the same time assures the abundance of fresh air that is as essential to fowls as for people.

The base should be the first part built. It is of 2 by 4-in. stock, and is nailed together with large spikes to make it perfectly solid. The uprights are then nailed to the base, and the slanting roof timbers spiked to the uprights. The frame material is all straight 2 by 4-in. stock. Six-inch barn siding should be used to board up the back, sides, and top, after which the two 3 by 3-ft. window sashes are screwed in place in the lower front.

An opening is left above the lower slanting roof, and a frame with a muslin covering is hung so as to swing back into the house. The door is made the entire width of the highest shed and is hung on heavy hinges. An opening is left in the door, into the upper portion of which the smaller sash is fitted. Below the sash a panel of wire mesh is tacked, to provide ventilation. The sides are not covered, but a good grade of heavy roofing paper should cover the entire top. The wall structure should be nailed securely enough to close all cracks.

Three strips of 2 by 2-in. stock form

LIST OF MATERIALS

HOUSE		FRAME
250 sq. ft. 6-in. barn siding.	4 lb. nails.	4 pieces, 2 by 4 in., 5½ ft. long.
2 sashes, 3 by 3 ft.	2 lb. wood screws.	4 pieces, 2 by 4 in., 4 ft. long.
1 sash, 1½ by 1½ ft.		4 pieces, 2 by 4 in., 2 ft. long.
1 pair heavy hinges.	ROOSTS	2 pieces, 2 by 4 in., 9 ft. long.
2 pair light hinges.	2 pieces, 2 by 4 in., 3 ft. long.	2 pieces, 2 by 4 in., 6 ft. long.
1 roll, 100 sq. ft., roofing paper.	3 pieces, 2 by 4 in., 5½ ft. long.	2 pieces, 2 by 4 in., 7 ft. long.

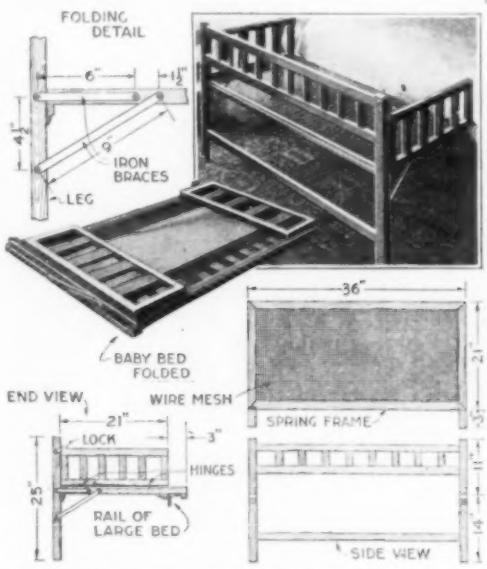
the roosts. The ends should be notched to fit into grooves in the short 2 by 4-in. strips, and the edges are beveled to afford a comfortable foothold for the birds. The lower edges of the 2 by 4-in. strips are boarded up to form a platform on which droppings are caught. The whole roost frame rests on narrow strips, fastened to the frame of the house, and slides back and forth to permit easy removal for cleaning.

The nests are constructed to slide out on strips also. They are made of siding, with a swinging door in the rear through which eggs may be collected.

A house of this type is suitable for housing a flock of hens throughout the year. It is cool and comfortable in the summer, while warm and dry in the winter.

A Homemade Folding Bed for the Baby

The folding baby bed, shown in the photographs and detailed in the working drawings, was made from odd pieces of lumber, mostly ¾ by 1 in. in section. It hooks onto the side rail of an ordinary large bed, and can be folded flat, and put under the bed, when not in use. The advantages of such an arrangement are evident, especially where space is quite limited. The side view, and the top view above it, show the general construction of the support and frame. The height of the legs depends, of course, on the height of the bed to which the small bed is to be attached. The bottom for the child's bed is covered with ½-in. wire mesh, fastened with staples, over which slats are nailed. Care should be taken in making and attaching the braces, shown in the end view, and in the folding detail. The braces are made of ⅛ by ½-in. iron strips, drilled as indicated. They are attached with round-head screws, given sufficient play so that the bed will fold easily. If, after braces are attached, the bed does not fold properly, adjustment can be made by elongating the holes. The end pieces are fastened to the bottom of the bed with hinges, and fold inward. Each piece is held upright by a ⅛ by

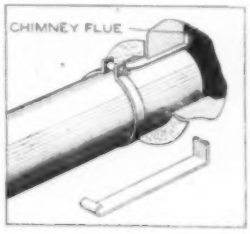


This Folding Cot for the Baby Is Convenient Attached to the Larger Bed, and can be Stored Compactly

½ by 2-in. strip of steel, fixed at the side of the bed, and swung into a slot in the corner of the end piece, as shown in the end view. A small cotton mattress was made to fit the bed.—A. J. Viken, Waterloo, Iowa.

Device Holds Stovepipe Securely at Flue Connection

Stovepipes will not work out of the chimney if secured in the following manner: A band of No. 18 gauge black iron is made to clamp around the pipe, as shown. The ends are drawn up with a small stove bolt, so that they will be about an inch apart when the clamp is tightened. A strip of the same iron is bent to form a right angle at one end, and a hook at the other end, as detailed. With the clamp over the pipe and the



right-angle end of the iron strip inserted in the chimney, the pipe is pushed into place. The hook is then coupled to the clamp by means of the clamp bolt, which is tightened to secure the stovepipe.

Tent Cot That Packs Compactly for Carrying

A tent cot which folds into a very compact bundle and affords shelter

Portable Tent Cot in Use with the Flap Serving as a Canopy

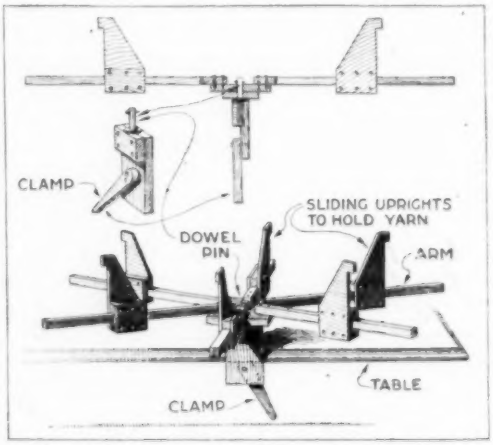
ample for a hunter's needs, can be made from 18 yd. of 10-oz. canvas, 29 in. wide, and some rope. The canvas is cut and sewed together in the manner shown, to form a shelter 3 ft. wide, 7 ft. long, and 4 ft. high, with a flap at the front that can be fastened down or used as a canopy, according to weather conditions. On arriving in camp, four strong stakes are procured and driven at the four corners of a rectangle, measuring 3 by 7½ ft., each pair being connected by a crosspiece, placed 2 ft. from the ground. Two stout poles are cut and slipped into the hems at either edge of the cot. The projecting ends of these poles are placed on the crosspieces outside the uprights, so as to keep the canvas taut. Two poles, about 7 ft. long, are employed to support the ⅜-in. ridge rope, which is continued at either end as guy ropes, the whole being 30 ft. long. An additional 60 ft. of ¼-in. rope is needed for remaining guys. When the tent is complete it should be waterproofed.

Cardboard Base for Bottle with Rounded Bottom

A bottle, or other vessel, with a rounded bottom, may be made to stand upright handily by incasing it in a roll of stiff paper, or cardboard. Make the width of the cardboard strip two-thirds the length of the bottle proper, and long enough to permit winding the strip twice around. Use glue or paste, and wind the covering as tightly as possible. The lower edge of the strip, when rolled and glued, should be just below the bottom of the bottle, and should be trimmed off squarely.—Frank L. Matter, Portland, Ore.

A Yarn Reel That Clamps to Edge of Table

For holding skeins of yarn while they are being wound into balls, the reel shown in the illustration proved efficient and popular. Whitewood, ¾ in. thick, was used to make it. Cut the central supporting piece first, making it 6 in. square. A 3-in. square piece is fastened under it, in the center, with 1¼-in. screws. Make the arms ¾ in. square and 12 in. long. Draw a 3-in. circle in the center of the 6-in. square block, and mark the places for the arms. Space them carefully, and fasten them with screws. The sliding uprights are shown in detail at the top.



The Yarn is Placed around the Uprights, Which are Then Moved Outward to Hold the Skein Taut

The main piece of the upright is cut from a ⅜ by 5 by 6½-in. piece, and shaped as shown. The reel turns on a dowel pin, or a nail. The clamp for holding the reel to the table is shown in detail. This should be made of hard wood. Make the handle 6 in. long, and wider at the upper end, tapering it to ½ in. The handle is pivoted on a strong screw. To put the clamp on the table, first turn the handle to the horizontal position and then force it down. In case it does not hold well on a thin table top, it will be necessary to put a thin piece of wood or paper above the clamp.—C. A. Butterworth, Newton Centre, Mass.

Altered Chiffonier Fills Many Kitchen Needs

The arrangement of my kitchen was such that I required a convenient place other than the pantry to keep numerous articles and, because of a wall register in the only available wall space, I could not have an ordinary built-in cupboard made. I solved the problem by purchasing an inexpensive five-drawer chiffonier, 47 in. high, 33 in. wide, and 16 in. deep, to which I added a backboard and a shelf at the top, and, at a height of 3 ft., a shelf on either side.

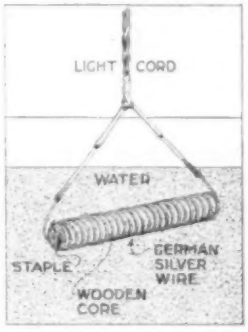
On the top shelf I arranged spice containers, while on the top of the chiffonier itself were placed quart and pint jars containing staple groceries. The five drawers were labeled "Cooking," "Cleaning," "Sewing," "Fruit," and "Miscellaneous." Beneath each label was pasted a card on which the contents of the drawer was listed. The top drawer was set aside for much-used small utensils. The second one was fitted with removable pasteboard boxes, one for window-cleaning articles, another for silver polish, a third for shoe polish, and so on. Freshly ironed clothes that needed mending were put in the middle drawer, where were also boxes for thread and shears, discarded pill bottles for needles and pins, and a partitioned cigar box for buttons. In the fruit drawer were such implements as an apple corer, a grater, and a grapefruit knife. The bottom drawer contained a variety of

Chiffonier with Convenient Shelves Added and Drawers Equipped to Take the Place of a Cabinet in the Kitchen

articles ranging from ant-proof casters to fly swatters.—Mrs. Avis Gordon Vestal, Chicago.

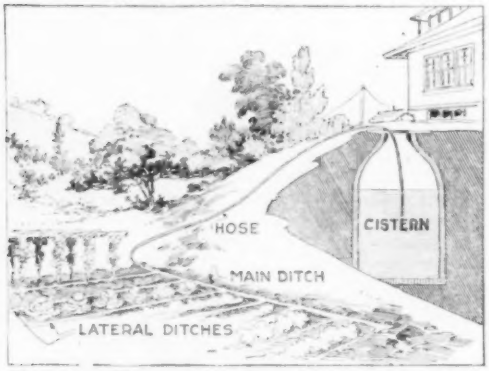
Electric Water Heater for Bathroom or Kitchen Use

Water may be quickly heated for shaving, or other use, with a home-made electric heater like the one illustrated. A 6-in. piece is cut from an old broomstick, and beginning from a staple driven into the end, a coil of German-silver wire is wound to another staple in the opposite end. The two ends of the coil are connected with the wires of a lamp cord attached to a screw plug. To heat a basin of water the coil is immersed and the current switched on. The coil should always be in the water before the current is applied.—R. R. Dowsley, Prescott, Ont., Canada.



Water for Garden Siphoned from Cistern

During the dry months last summer we assured a rich return from our

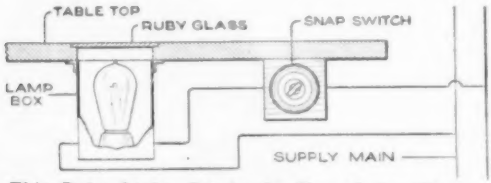


Siphoning Water with a Hose from a Cistern to a Garden Occupying Near-By Low Land

home garden by irrigating our vegetables from the house cistern which was on land higher than the garden. A hose was employed to siphon the water to a main ditch, from which extended lateral ditches between the rows of growing plants. By carefully conserving our supply we had water enough to last all summer. By corking the hose at the downward end, and filling it with water before placing the other end in the cistern, the siphon is started by the flow of water caused by removing the cork.—K. M. Coggeshall, Webster Groves, Mo.

Ruby Film-Examining Lamp Set in Table Top

In developing photographic films, a small ruby lamp, suitably housed, and over which the strip of film is passed

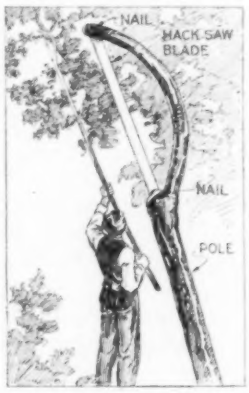


This Ruby Light, Set in the Top of the Photographic-Workroom Table, Is Handy for Examining Films and Negatives

to determine if it is fully developed, is a convenience. To make such a device, a porcelain receptacle is fastened to the bottom of a wooden box, about 4 by 5 by 6 in. in size, with a sliding top of glass. The glass has a coating of ruby coloring fluid, or two thicknesses of tissue paper may be pasted on the inner surface, one piece orange and the other red. The box is sunk in the developing bench, or table, flush with the top of the bench. The wires from the globe receptacle lead to a snap switch under the edge of the bench, and thence to the supply wires. A battery of dry cells may be used, but a smaller light globe is then necessary.—W. H. Buntin, Ely, Nev.

Improvised Pruning Tool Made from a Hacksaw Blade

Having occasion to cut a few branches from the tops of some slender saplings and not being equipped with the necessary extension saw, I contrived a saw with a long handle as illustrated. I procured a discarded hacksaw blade, and from a near-by thicket cut a pole with a fork on the end of it. One side of the fork was cut off and after making a slit with a saw, the blade was attached with a nail, as shown. The other side of the fork was slit at the end and bent over to engage the saw.—Dale R. Van Horn, North Loup, Neb.



Taking the Stretch Out of a Clothesline

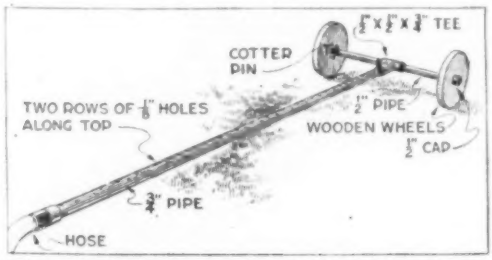
If a new cotton clothesline, or one that has been in use, is boiled in water for a few minutes and allowed to dry before being used it will be thoroughly shrunk. A line thus treated will not stretch.—W. S. Standiford, Youngstown, Ohio.

Guide for Keeping Course in Rowboat

A rowboat may easily be kept in its course by the oarsman, especially when alone, by sighting on a suitable object on shore, or elsewhere, over a notched stick set vertically in the stern. This avoids the necessity of turning around frequently to determine the direction in which the boat is headed. The method is especially useful in crossing wide lakes, or rivers, in which the current is likely to carry the boat from its course.—W. S. Wilson, Cascades, Que., Canada.

Lawn Sprinkler on Casters Made of Length of Pipe

Lawn sprinklers of the conventional manufactured types are usually difficult to move without getting a shower bath or turning off the water. A handy sprinkler of superior design, which may be easily pulled about the lawn by the hose, may be contrived in the home workshop from a 10-ft. length of ¾-in. pipe. Two rows of ⅛-in. holes are drilled along the top to form the spray, and a pair of wooden wheels which may be sawed from any round post are fitted to axles made from two pieces of ½-in. pipe. A tee joint, ½ in. by ½ in. by ¾ in., is used to connect the wheels and axles to the spray pipe as indicated. Cotter pins set in holes drilled in the axle pipes prevent the wheels from running in too

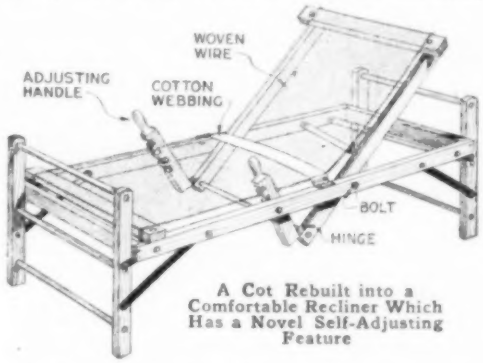


This Lawn Sprinkler may be Moved About without the Necessity of Turning Off the Water or Getting a Shower Bath

far. Caps screwed on the ends of the axles keep the wheels from coming off. —Albert O'Brien, Buffalo, N. Y.

Self-Adjusting Recliner Made from Old Cot

To provide a comfortable, adjustable, flat-back recliner for an invalid,



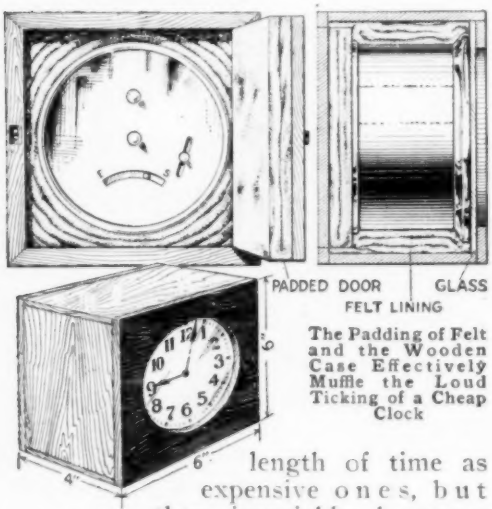
A Cot Rebuilt into a Comfortable Recliner Which Has a Novel Self-Adjusting Feature

at minimum cost, an old cot was rebuilt. This was of the wooden-frame type, with a woven spring, and was inexpensive. The usefulness and comfort of the arrangement commends it as a worth-while adaptation for general use, especially as a piece of camp or cottage furniture.

A frame of 1¼ by 2½-in. wood, bolted together, was fitted between the sidepieces of the main frame, as shown, and arranged to pivot on bolts. A wooden rod was set across the lower end of this inner frame. Adjusting handles, of the same material as the frame, and notched as shown, were hinged to the lower end of the frame sidepieces, and ¾-in. wooden pins fitted for the adjustment of these handles. A strip of cotton webbing was fastened across the main frame, holding the spring taut. The method of adjustment is simple. The end of the inner frame is raised and the adjusting handles set. This can be done by a person reclining on the cot, especially after the back rest is once raised. Since the point at which the cotton webbing holds down the springs is slightly in front of the pivot bolts, the person reclining needs only to move forward slightly, and release the adjusting handles, when the back will be drawn forward automatically, to the desired position. The handles are then set, and are held by the notches.

Muffling the Loud-Ticking Clock

Cheap clocks often run quite as accurately and give as good service in



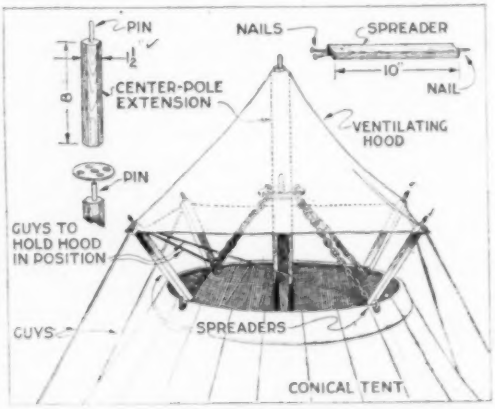
The Padding of Felt and the Wooden Case Effectively Muffle the Loud Ticking of a Cheap Clock

length of time as expensive ones, but they invariably betray their cheapness by the noise they make. A noisy dollar clock was effectively muffled, as illustrated, so that it can be used in any part of the house without advertising itself. A box of ¼-in. hard wood 6 in. long, 6 in. high, and 4 in. deep, was made. A hole, 4¼ in. in diameter, was cut in the front and covered with a piece of glass. The back was hung on hinges and provided with a latch. The finished box was sandpapered smooth, thoroughly stained, and varnished. The clock was placed inside the box, as shown in the drawings, and was tightly packed with layers of felt. The back was also provided with a felt pad which was tacked on the inside. By opening the door the clock may be wound. By means of the glass regularly fitted over the face of the clock and that over the front of the box, sounds that would otherwise escape in that direction are deadened. The felt prevents the noise issuing in other directions.

¶By moistening the buttonholes of starched clothing on the inside, buttons may be inserted easily without soiling or crumpling the area surrounding the buttonhole.

Ventilating Hood for Conical Tent

Many conical tents are provided with ventilating hoods, but they must usually be closed when it rains. The poor ventilation on rainy days and the danger of leaving the hood open at night led to the making of the ventilating hood shown. To make this arrangement, remove the ordinary hood and sew it, as indicated, to form a cone. Make an 8-in. extension of oak for the center pole. Bore a hole in each end the size of the pin in the center pole, fit one of the holes to slip over the center-pole pin, and, in the other end, drive a wooden dowel, or iron rod, long enough to project 3 in. Cut four pieces from elm, or other tough wood, ⅜ by 1¼ by 10 in., to be used as spreaders. Drive nails in each as detailed, and cut off the head of the single nail and file it to a point, to insert in the eyelets in the hood. Set up the pole extension and put the hood in place. Tie the guy ropes loosely. Next slip the spreaders into the eyelets of the hood and set them on the hooks of the top chains. It will be found necessary to guy one of the spreaders with a light cord, as shown, to keep the hood in its proper position. This type of hood was used throughout the season, and



The Ventilating Hood was Easily Refitted to Keep Out Rain and Yet Provide Thorough Ventilation

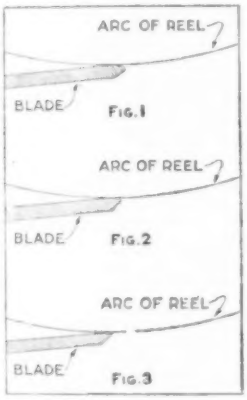
gave good ventilation and protection without adjustment. There was no leakage during the heaviest rains. —Joseph T. Sproule, Watkins, N. Y.

Machine Screws Used as Forms for Making Small Springs

Small springs may be accurately formed by winding the wire tightly into the threads of a machine screw. This forms a spring quite as perfectly as a handmade spring needs be. A screw somewhat smaller than the size of spring desired should be used, to allow for the resiliency of the wire.

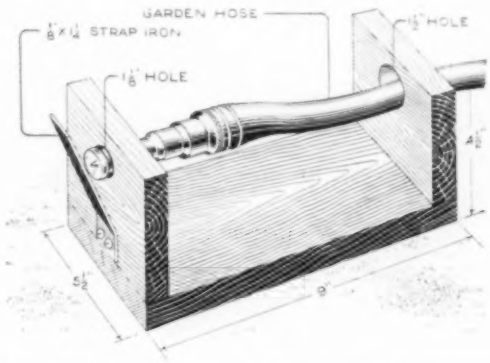
Improved Way of Sharpening a Lawn Mower

In eight years of sharpening lawn mowers I have found that the sharpening, as done by many, is not satisfactory, partly because of loose bearings that permit the grass to force the reel away from the blade. I first drop the blade so that the reel bearings can be adjusted to prevent play without causing friction. I then take off the blade and grind a sharp straight edge and, on replacing it, adjust it carefully. Fig. 1 shows a badly worn blade, while Fig. 2 shows one partly sharpened by the tedious but commonly recommended method of applying oil and emery to the blade and revolving the reel backward. Fig. 3 shows a blade sharpened by my method.—Harry G. Rosenfeld, Black Earth, Wis.



Hose Nozzle and Stand Serve as Adjustable Sprinkler

A convenient sprinkler stand for use with garden hose, by means of which the spray can be easily regulated, can be made by boring a hole in either end of a box, from which three sides have been removed, and placing in front of one hole a slanting metal deflector, as shown. If the nozzle is placed close to the deflector it will produce a wide spray. By drawing it back slightly the spray will be made heavier and will not



An Easily Constructed Stand in Which Garden Hose can be Adjusted to Sprinkle a Wide or Limited Area

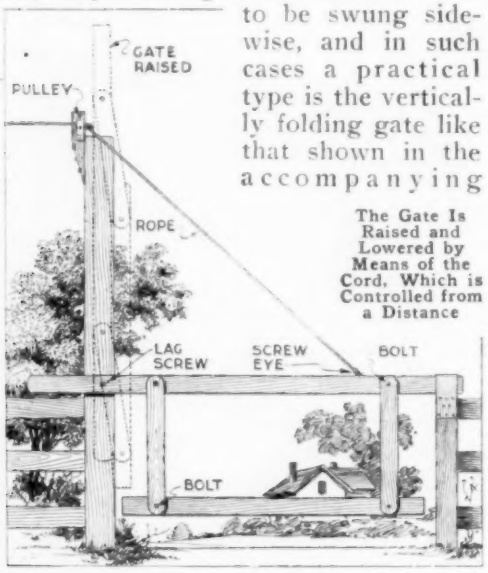
carry so far. Other adjustments can be made by changing the angle of the metal parts. When set in the sprayer the nozzle should be tied in place, otherwise the recoil of the water pressure will tend to dislodge it.—W. A. Blind, Chicago.

A Stamp and Envelope Moistener for Pocket Use

When traveling, if one's correspondence is at all extensive, moistening envelopes and stamps soon becomes irksome and disagreeable, to say nothing of the insanitary effects. I abolished this annoying task while on a recent trip by converting a cheap fountain pen into a moistener, as shown. The pen point was removed and discarded. The feed groove was then cut a little deeper and a small silk sponge inserted. With the ink reservoir filled with water, one or two strokes over the gummed side of a stamp make it ready for application.—P. J. Backus, Delphos, Ohio.

Vertical Folding Gate Opened from Distance

It is sometimes desirable to fit a passageway with a gate that does not need to be swung sidewise, and in such cases a practical type is the vertically folding gate like that shown in the accompanying



The Gate Is Raised and Lowered by Means of the Cord, Which is Controlled from a Distance

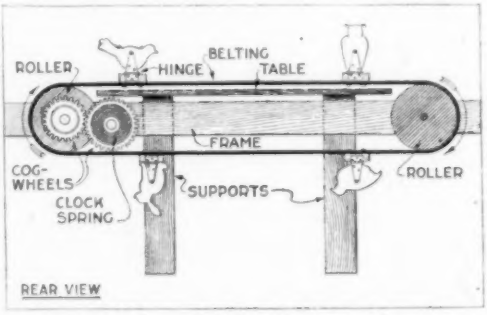
illustration. An added feature is that it can be opened or closed from a distance by means of the rope-and-pulley arrangement. The gate is made of 1¼ by 3-in. wood, and otherwise dimensioned to suit the special location. The main horizontal bar is fastened to the post, or other support, by means of a lag screw, and the other joints are bolted. When the gate is raised, the left vertical bar should clear the lag screw. This is accomplished by countersinking the head of the latter, and fitting washers between the pieces at the bolts.

Improving Razor Edge by Dipping in Hot Water before Stropping

By dipping my razor in hot water before stropping I obtain a keener and smoother edge than by stropping with the metal cold. The heat expands the metal, with the result that the molecules of steel worn away on the strop disappear evenly. The temperature of boiling water is insufficient to damage the blade.—Donald A. Hampson, Middletown, N. Y.

Self-Setting Moving Targets Operated by Clockworks

Shooting at tin cans or other still targets soon becomes monotonous to the amateur who has attained considerable proficiency as a marksman. A moving target, and especially one that does not have to be reset after every successful shot, is therefore appreciated. An old clock motor is usually obtainable from any jeweler's junk box and may be converted to serve as motive power for a target of this type, as shown in the sketch. Two wooden rollers 4 in. in diameter and 3 in. long are mounted on hardwood shafts, or on bolts, between two wooden strips, ⅞ by 2 by 30 in. long, the rollers being set 24 in. apart. The clock motor is connected with one of the rollers, so as to drive it slowly. Birds, rabbits, or other figures, are then cut from sheet iron, with a cold chisel, and fastened to a belt, with hinges, as shown. When a target is struck, it falls back, and comes into normal position again when passing through the lower half of its course around the rollers. A smooth hardwood board placed under the upper section of the belt, prevents the sagging of the targets from their proper position. A piece of heavy sheet metal is fixed over the mechanism to protect it from bullets. This should be formed so that but two



The Moving Targets Fall When Struck, and are Automatically Righted in Their Return Course to the Original Position

targets are presented to the marksman as they move across his range. Narrowing the opening cultivates quick sighting.

Untanned Sheepskin Is Good Wiper for Windshield

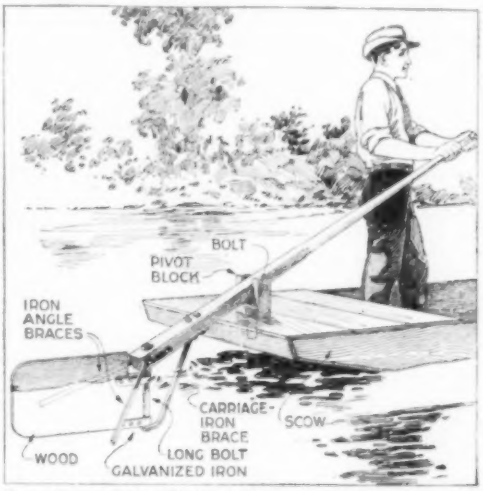
A piece of untanned sheepskin provides a practical windshield wiper for motorists, motormen, and others. To make the wiper, cut a piece of the sheepskin 4 in. square, and clip the wool to ½ in. in length. In use, rub the wet windshield, or wet the skin in applying it to dry glass. The glass becomes slightly oil-covered, thus preventing rain or snow from sticking to it.—C. P. Dinsmore, Ewan, Wash.

Animal Traps Anchored Properly to Hold Catch

To eliminate the sudden jerks that often allow entrapped animals to free themselves, a brush drag attached to the anchor chain is useful. For small animals, the drag is attached near the trap, and the chain slacked somewhat between the trap and the anchor. For larger animals, a piece of baling wire, several feet long, tied to the trap instead of the regular chain and fastened to a solid anchoring, was found satisfactory.—H. K. Capps, Stahl, Mo.

A Fishtail Propeller for a Rowboat

Oars, or poles, are clumsy and unsatisfactory when used in shoal water, but in such places, and in deep water too, a fishtail propeller, as illustrated, is satisfactory. For a small sum a blacksmith will supply the metal fittings. These consist of a carriage-iron brace, 22 in. long, with a ¼-in. hole near the lower end and two such holes at the upper end; one ⅜-in. carriage bolt, 14 in. long; two angle-iron braces of ¼-in. carriage iron bent at an angle of 45°, and a few smaller carriage bolts. The tail fin may be of any clear whitewood. It should be 21 in. long, 12 in. wide, and 1 in. thick. The handle is made from a piece of wood, 3 in. square, and 5½ ft. in length. At the point where it is attached to the tail it is left full size, but is smoothed off on the upper end to form a neat handle. The pivot block is cut from a piece of oak or other hard wood, 14

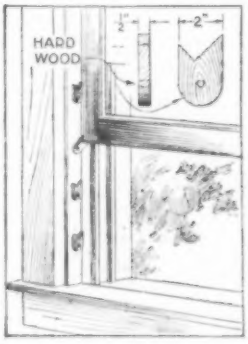


Propellers of the Fishtail Type Are Convenient for Use in Shallow Water or in Places Where There Is Sedge Grass or Seaweed

in. in length, 7 in. wide, and 3 in. thick. The parts are then assembled as in the sketch. Swinging the handle horizontally oscillates the tail fin on its hinged fastenings between the two angle braces on either side. It is thus given the propelling motion similar to that of a fish's tail when swimming upstream. Steering as well as propulsion is accomplished with the device.—M. E. Thornton, Arlington, Mass.

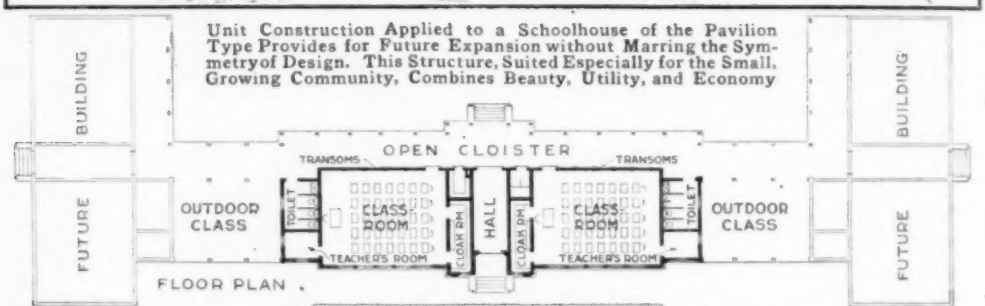
Handy Stops for Holding Raised Window

Window stops that serve as an excellent substitute for repairs when weights become detached, or as a permanent feature on windows having no weights, may be made from pieces of wood and screws, as shown. As many stops should be provided as are necessary to provide the adjustment of openings desired. Once raised, the window is securely held.



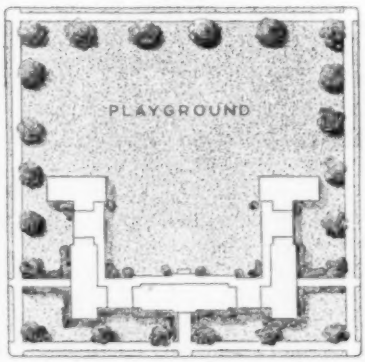
ARTISTIC SCHOOL BUILDING OF MODERATE COST

Unit Construction Applied to a Schoolhouse of the Pavilion Type Provides for Future Expansion without Marring the Symmetry of Design. This Structure, Suited Especially for the Small, Growing Community, Combines Beauty, Utility, and Economy



FLOOR PLAN

COURTESY SOUTHERN PINE ASSOCIATION



NELVIL C. BETTOON, ARCHITECT

GRADUALLY civic pride and rural progressiveness are expressing themselves in the architecture of our schoolhouses. We are coming to realize that when such structures are devoid of charm they are detrimental to their communities. Experience and a better appreciation of values are teaching the necessity of providing our boys and girls with refined, pleasing, character-building surroundings.

In accomplishing these ends economic foresightedness is causing the trend to turn toward unit construction—a system that meets prevailing requirements and provides for future expansion without marring the symmetry of composition. Illustrated herewith is a schoolhouse that embodies in a well-balanced way the various needs of the small, growing community. It is picturesque in its hospitable appearance and moreover structurally economic, for harmonious additions may be made as conditions dictate.

The building represents what is termed the pavilion type. It is a one-story frame structure built in units containing from one to three rooms. These are connected by covered cloisters and surround an open court. An inviting, distinctive effect, rather than a hackneyed, forbidding one, is produced.

The central section of the building comprises the original unit. The lightly drawn part at the left is an addition such as would be established at the right when needed. Each unit is spaced about 25 ft. from adjoining ones. All of the classrooms have small private offices for the instructors. Splendid illumination and ventilation are obtained. Multiple windows are arranged along one wall while the opposite one is given over to blackboard space, above which transoms are installed. Since the latter are high and under the cloister, they do not admit conflicting light. The cost of the building will vary from $3,500 to $4,000, according to the local conditions.

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